The life and work of the Revd. T.H.E.C. Espin, perpetual curate of Tow Law, with special reference to his astronomical research

Brown, Arthur

ESPIN , HIS LIFE AND WORK

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ABSTRACT

Thomas Henry Espinell Compton Espin the son of a Professor of Pastoral Theology was born at Birmingham in 1858. He was educated at Haileybury and went up to Exeter College Oxford in 1878, leaving in 1881

In 1882 he was ordained deacon in the Church of England and appointed to a curacy at West Kirby, diocese of Chester, his father concurrently being Rector of the adjacent parish of Wallasey. He became priest in 1883 and two years later father and son moved to the parish of Wolsingham, diocese of Durham, the former to be Rector and the latter curate.

The Revd. T.H.E.C. Espin was given the nearby living of Tow Law in 1888 and he remained incumbent of that parish for forty six years until his death there in 1934.

From early youth Espin took an interest in astronomy. At the age of nineteen he became a Fellow of the Royal Astronomical Society - one of the youngest to do so, and for the remainder of his life he pursued this study in which time he discovered 2,575 double stars, 4,118 red stars, and published data on 1,424 stars with remarkable spectra. In 1910 he discovered Nova Lacertae and later received the Jackson Gwilt Medal of the Royal Astronomical Society. Much of this research was carried out in his observatory at Tow Law.

In addition Espin entered into X-ray work early in 1896 and provided a free diagnostic service therewith for seventeen years. He practised ionic medication, kept a small tuberculosis sanatorium, and had a variety of other activities.

Posthumously his name has been assigned to Mount Espin, a feature on the 'far side' of the Moon revealed by space photography.

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THE LIFE AND WORK OF THE REVD. T.H.E.C. ESPIN

PERPETUAL CURATE OF TOW LAW

WITH SPECIAL REFERENCE TO HIS ASTRONOMICAL RESEARCH

by

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A THESIS

PRESENTED FOR THE DEGREE OF M.Sc.

IN THE UNIVERSITY OF DURHAM

MARCH 1974

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PREFACE

In August 1970 there was held in Durham a meeting of the British Association for the Advancement of Science ; an event unique in the long history of that city. In order suitably to mark the occasion a Science Fair was held at which many aspects of technology were exhibited, and a particular display was devoted to contributions to knowledge which had originated in and about the County of Durham.

Amongst these - and there were thirty or so altogether - there was an outline of the astronomical activities of the late Revd. T.H.E.C. Espin who spent the greater part of his life as the incumbent of the parish of Tow Law in the north-west of the county. The interest thereby created led to a more thorough investigation of this remarkable man of whose life and work no complete account had then been written : the outcome of which is this thesis.

Two points require initial comment :-

Firstly : The Revd. T.H.E.C. Espin was often referred to as a 'vicar' . This was a courtesy title only and in the interests of historical accuracy his legal and religious status of 'perpetual curate' has been explained in the section devoted to the topography of Tow Law.

Secondly : In order that material sources of information however small from which the text has been derived may be readily available to any who may wish to examine them, by far the greater part of these is provided in photocopy in the accompanying dossier. Some of the original material reposes in odd places in the households

of elderly people : it may well disappear in the near future and so be lost forever. For this reason the copies are now made. The few items not included are detailed separately with the places where complete copies may be found and consulted.

Taken together these references embrace every traceable and trustworthy source. Negligible use has been made of comment which appeared in the popular press.

Surviving contemporaries who were familiar with Espin are very few and of advanced years. Some, indeed, have passed away whilst this work was in progress, but even so each statement of fact obtained from them verbally has been verified independently from at least two persons, and where surmise was needed such is indicated in the text.

Dr. D.M. Knight of the Department of Philosophy of Durham University, as academic supervisor, has rendered much encouragement throughout and to him most grateful thanks are tendered.

ACKNOWLEDGMENTS

The delineations of armorial bearings have been verified by Rouge Dragon Pursuivant of the College of Arms.

Part of the paternal ancestry was furnished by the Society of Genealogists of London.

CONTENTS

ABBREVIATIONS USED IN TEXTUAL REFERENCES

AA	...	Astronomy and Astrophysics
AB	...	Act Book of the Diocese of Durham
AJ	...	Astrophysical Journal
AN	...	Astronomische Nachrichten
BS	...	The Binary Stars (Aitken : 1964 edition)
EM	...	The English Mechanic
H	...	Henson : Retrospect of an Unimportant Life (Vol. II : 1943)
JBAA	...	Journal of the British Astronomical Association
JLAS	...	Journal of the Liverpool Astronomical Society
JRASC	...	Journal of the Royal Astronomical Society of Canada
JS	...	Journal of Science
MNAS	...	Minutes of the Newcastle Astronomical Society
MNRAS	...	Monthly Notices of the Royal Astronomical Society
N	...	Nature
O	...	The Observatory
P	...	Page : A Victorian History of the County of Durham (Vol II : 1907)
R	...	Rounthwaite : The Railways of Weardale (1965)
RS	...	The Red Stars (Royal Irish Academy : Cunningham Memoirs : V : 1890)
S	...	Sparrow : Mark Pattison and the Idea of a University (1967)
T	...	Tomlinson : North Eastern Railway : Its Rise and Development (1967)
TNIME	...	Transactions of the North of England Institute of Mining Engineers. (Vol. 5 : 1857)
W	...	Whellan : History, Topography, and Directory of the County of Durham (1894)
WOR	...	Wolsingham Observatory Report
WPM	...	Wolsingham Parish Magazine (1888)

CHAPTER I

ANCESTRY

The forbears of Thomas Henry Espinell Compton Espin are not known completely. His paternal line stemmed from the family of van Espen whose members resided in the lands of the ancient Duchy of Brabant. This region is now divided into North Brabant which is the largest province of Holland, and Brabant, the metropolitan and central province of Belgium. The latter is further subdivided into the arrondissements of Brussels, Louvain, and Nivelles.

An eminent member of the family was Zeger-Bernard van Espen, an outstanding theologian born at Louvain in 1646 and who died at Amersfoort in 1728, an outline of whose life is given separately.

Two armigerous lines existed : their Arms being as follows :-

(α) ESPEN (van) : Brabant D'arg a deux rameaux de laurier de sin., passes en saut., acc. en chef d'un coeur de gu. The English translation is : Argent two sprigs of Laurel in Saltire Vert with in chief a Heart Gules.

(β) ESPEN (van) : Brabant De sa. au saut. engr. d'or, acc. en chef d'un huchet d'org. This rendered into English reads : Sable a Saltire engrailed Or in chief a Horn Argent.

The genealogy thenceforward can be traced with reasonable exactness from records in this country where the Anglicised name of Espin was always used. In passing it may be remarked that no grant of English Arms was ever made to any member thereof nor to anyone bearing a variant of the surname Espin and no pedigree entry exists in the official records of the College of Arms. It is, however, known that plate bearing a 'family crest' was in the possession of the Revd. T.H.E.C. Espin, and so far as can be determined this included an aspen leaf, presumably in allusion to the name Espin.

The earliest English references occur in the XVIII century. Thus Katherine Espin married William Whip of Newark at the church of S. Peter-at-Arches, Lincoln, on 9th April 1732, and Ann Espin married John Denton, both of Scothorn, in the church of S. Mary Magdalen, Lincoln, on 29th September 1752. With the lapse of time the family spread and diversified. The name appears in the neighbouring County of Nottingham where John Espin married Sarah Byron at Beckingham on 13th February 1786, and in Derbyshire an Espin was Superintendent of the Butterly Machinery Works in 1809.

It is, however, to Thomas Espin, farmer, of Holton Beckering, Lincolnshire, who died on 10th March 1810, aged 76 years that attention must be directed. He was the great-grandfather of the Revd. T.H.E.C. Espin and the lineal descent can be set out in detail. This Thomas Espin was twice married and he had three sons Thomas, John, and William. The eldest son (Thomas) by the first wife was born at Holton Beckering c. 1766, and in 1790 at the age of 24 years, became Master of

which was an old-established seminary founded by Dr. Mapletoft, Dean of Ely, in the XVII century. He was an artist and a Fellow of the Society of Antiquaries, and died aged 55 years, on 14th December 1822, his body being interred, unusually, in a mausoleum of Gothic design in the garden of his home, Priory Cottage, Louth. There is no record of any issue.

The second son (John) was also born at Holton Beckering by the second wife. His date of birth is unknown but there exists a Will executed on 31st January 1812 by John Espin of Louth which may well relate to this son. The evidence on the point is not conclusive but if, in fact, such was the case, then John was by trade a carpenter and an illiterate. The Will makes no mention of wife or children and since he left his goods to his brother William Espin it is presumed that he was childless.

The third and youngest son (William) by the second wife was born at Priory Farm, Bullington, Lincolnshire, in 1797, being thirty years or so junior to his half-brother Thomas : the father having moved to this new address from Holton Beckering. William became a schoolmaster and in his early twenties resided at Mansfield, Nottinghamshire. On 10th July 1822 he married Sarah Nicholson aged 21 years, by licence in her parish church at Southwell, Nottinghamshire. After the marriage William Espin had, in 1826, an Academy for Free and Boarding Pupils in Enginegate and Eastgate, Louth, Lincolnshire, and was later Head of Grove House Academy, Brunt Street, Mansfield, in 1851, where he died on 16th February 1865 aged 68 years. William was the grandfather of T.H.E.C. Espin. He married twice and had four children as follows :-

Revd. Thomas Espinell Espin, first son born c. 1824.

Revd. William Espin, second son born 1824–1837.

Revd. John Espin, third son born c. 1837.

Annie Sarah Espin, only daughter, born 1852.

It is a matter of conjecture as to the blood relationship between these children. The probability is that the first two were children of the first wife, Sarah, and the second two children of his second wife Mary ..... (maiden name not known) .

The eldest son mentioned above (Thomas Espinell Espin) was the father of the Revd. T.H.E.C. Espin. He had an illustrious academic and clerical career of which a summary is appended. He married Eliza Jessop and they had an only child in the person of the Revd. Thomas Henry Espinell Compton Espin, of whose life and work this record is written.

Data relating to the remaining three children of grandfather William Espin are now given :-

The second son the Revd. William Espin also had an only son, the Revd. Arthur Espinell Espin, who graduated B.A. at Keble College, Oxford in 1887, and resided at Astley Bridge, near Bolton, Lancashire. The latter was, therefore, a cousin or half-cousin of T.H.E.C. Espin of Tow Law.

The third son the Revd. John Espin, after graduating M.A. at Merton College, Oxford in 1862, migrated to South Africa where he became Chancellor of S. George's Cathedral at Grahamstown. He had a son, Cyril Espinell Espin, who graduated B.A. in 1903, became a solicitor with a practice in Grahamstown and during the First World War (1914–1918) served as a lieutenant in the Coldstream Guards. He was either a full cousin or a half-cousin of the Vicar of Tow Law.

Annie Sarah Espin, the last child and only daughter by the second wife married John Mallam Phillips and they had a son Colonel William Mallam Phillips C.B.E. She died on 26th December 1931. Colonel Phillips died in 1948, but his son J.L.E. Phillips B.A., LL.B. (Cantab) is in practice as a solicitor in the City of Lincoln at the present time (1972) .

After protracted enquiry little has been forthcoming as to the antecedents of the Revd. T.H.E.C. Espin in the maternal (Jessop) line. There is some evidence to show that they had wealth and position and were well-disposed towards him. Espin acknowledged with gratitude the contribution made by Captain Jessop towards the cost of repairing his observatory at Tow Law when it was severely damaged by a gale on 22nd December 1894, and he enjoyed many years of considerate attention extended to him by Miss Siddons of Honley, near Huddersfield, Yorkshire, who was always referred to as his 'cousin' and would therefore belong to the maternal line. Miss Siddons was a lady of great wealth who regularly kept four thousand pounds in her current banking account. She bestowed many favours upon him.

A short appraisal may now be made of the family of the Revd. T.H.E.C. Espin, its social position, and fortune.

In the generation of his parents the family was clerical and military. Two of his father's brothers (or half-brothers as the case may be) were clergymen, and his uncle was a colonel decorated with the C.B.E. On his mother's side it is known that there was a Captain Jessop as mentioned earlier.

In the generation of his grandfather (William Espin) it was scholastic, and in the time of his great-grandfather (Thomas Espin) agricultural. Espin's early kinsman the savant Zeger-Bernard van Espen (1646-1728) studied at the University of Louvain, became a priest, and later occupied a Chair in the College of Pope Adrian IV. It is certain, therefore, that Zeger-Bernard was of the Catholic faith, whilst the Espins in England were Protestants. One is left to ponder as to whether it was this division of religious beliefs which brought about a settlement of a branch of the family in Lincolnshire.

The Espins, as already stated, came from the Low Countries where the terrain was similar to that existing in Lincolnshire, so it is feasible that they began work as engineers concerned with land drainage and later took up farming. Possibly the Eighty Years War (1568-1648) in which religion was so prominent an issue, and the later War of Spanish Succession (1702-1713) made their contributions to this migration, but at this late date such can only be a hazard.

Espin was, of course, an only child and so bereft of the society of brothers and sisters. His nearest relatives - apart from parents - being cousins or half-cousins all living remote from his parish. Nearby his father the Revd. Thomas Espinell Espin was Rector of the parish of Wolsingham until his death there at the age of 88 years on 5th December 1912. His mother predeceased her husband : she died aged 61 years at Wolsingham on 27th May 1891. Hence for his first three years at Tow Law (1888-1891) Espin enjoyed the blessing of two living

parents but thereafter he had an ageing father for the next twenty-one years (1891-1912) and no immediate living relative for his last twenty two years (1912-1934). The inference is that he pursued a comparatively lonely bachelor life and his position with respect to the working class community of Tow Law was one of benign detachment - well fitted to his clerical calling. With them he had little in common intellectually and such contact as he did make would be through the media of church activities and the judicial bench, for it is to be remembered that he always had a curate at hand to give daily assistance.

The ancestral paternal line evidently amassed wealth. Thomas Espin the schoolmaster of Louth who died on 14th December 1822, to quote the sworn declaration of his executors 'did not die possessed of goods to the amount of three thousand pounds' which in the legal phraseology of the period meant that the value of his estate was close to that sum. William Espin, the grandfather of T.H.E.C. Espin who died on 16th Februgry 1865 left effects under one thousand pounds at the end of a life of 68 years during which time he had educated three sons at Oxford and seen all of them consecrated as clergy of the Church of England. This sum would be equivalent to L.5,453 in terms of 1972 values (1). Espin's own father held the living of Wolsingham for twenty seven years (1885-1912) which carried a substantial income and a free house. At his death the net sum was L.590 a year which as will be shown was equal to L.3,628 per annum in terms of 1972 money values. Quite apart from this his father held other ecclesiastical offices so that his total rewards must have been in

excess of that amount. The Revd. T.H.E.C. Espin was the sole executor and exclusive beneficiary of his father's estate which amounted to the gross value of L.4,595. 6s. 10d. and equal to L.28,260 as valued in 1972. (2)

Income from the Tow Law living, also with a free house, varied over the years. An analysis made at quinquennial intervals, with equivalent 1972 values, now follows. The values in all cases are given to the nearest complete pound.(3)

Year	Actual (net) income (L)	Equiv. 1972 value (L)
1890	290	1,904
1895	290	2,044
1900	290	1,904
1905	290	1,904
1910	267	1,642
1915	267	1,234
1920	267	612
1925	254	723
1930	266	992

For forty six years (1888-1934) Espin enjoyed the parson's freehold at Tow Law and apart from the war years (1914-1918) and their aftermath extending until 1925, his position, though modest, was an assured one financially. Even during the war years he had as assets the benefits of his father's legacy. Donations in cash and in kind came to his aid quite frequently in connection with astronomical work. Miss Julia Compton (an aunt who added her own selection of names at Espin's baptism) was most generous to her nephew and she left him a legacy when she died in 1892. Prebendary T.W. Webb gave him one hundred pounds in 1890 towards the cost of his observatory, and Miss Brook, Captain Jessop, and Canon Slatter to name but three, all made contributions.

In sum these data show his circumstances to have been above the competence to which a country clergyman would be normally accustomed. He had the invaluable good fortune of being possessed of wealth of mind and body quite aside from money and estate, and it was, indeed, upon such favourable foundations that his life's work was based, and became possible.

Notes :-

1 The method used for calculating 1972 equivalent values is explained fully in the section headed 'Indices of Retail Prices' included in the dossier. q.v.

2 The values of the estates left by Espin and his ancestors have been derived from the probates granted in respect of their several Wills.

3 The income of Espin as incumbent of the parish of Tow Law has been ascertained (α) for 1890 to 1905, from the appropriate Clergy Lists, (β) for 1910 to 1930, from Crockford's Clerical Directory for these years.

CHAPTER II

BIRTH CHILDHOOD AND ADOLESCENCE

The infant Espin was born at No. 5 Crescent East, Birmingham, on 28th May 1858, his parents being Eliza Espin (née Jessop) and the Revd. Thomas Espinell Espin, Rector of Hadleigh, Essex, and Professor of Pastoral Theology at Queen's College, Birmingham. The birth of the child was registered on the 29th June 1858 by his mother - an unusual circumstance in Victorian society when by prevailing custom such was considered to be the plain duty of a husband. The full name of her son declared to the civil registrar was Thomas Espinell Espin and this description appears in the Register of Births for the Ladywood Sub-district in the County of Warwick for that year.

On 11th August 1858 the baptism of the infant according to the rite of the Church of England took place in the parish church of S. James-the-Less, Hadleigh, at which the curate the Revd. W.E. Heygate officiated. The service was not without incident for at the ceremony the caprice of an aunt - Miss Julia Compton - changed the course of events quite unexpectedly. She had been given the honour of holding the child as the family stood around the font, and when the priest asked the prescribed question 'Name this child', Miss Compton could not restrain herself from adding 'Henry' and 'Compton' as her choice of additional Christian names. To the question asked, therefore, her reply was 'Thomas Henry Espinell Compton Espin' which the curate immediately pronounced in the act of baptism.

The entire incident occurred so quickly that the disconcerted family was presented with a fait accompli. They could do nothing. Even had they wished to remonstrate the requirements of decorum would have imposed silence. Thus the baptismal names, and the legally-registered names, of the child, differed throughout his life.

No discord arose because of Miss Compton's impulsive action. The family evidently understood the very human motives by which she had been actuated. A lifelong spinster with no child of her own to cherish, she had yielded to Nature and seized upon this one opportunity by which her name and affections could be perpetuated even in the offspring of another. Few would censure her : many more would sympathise, and at least she was a godmother.

In his later years Espin used each form of his name as the occasion required ; the full name being reserved for official and legal matters and the shorter for general correspondence. For instance the citation in his last Will and the registration of his death both carry the complete name.

Virtually nothing has been forthcoming as to his boyhood and early education. In the 1860's there were no elementary schools made available to children by local authorities as there now are, and even if such had existed it is almost certain that Espin's father would never have sent his son to one when private tuition was to be had by such as could afford to pay for it. His grandfather, William Espin, remained Head of Grove House Academy at Mansfield in the County of Nottinghamshire about sixty miles distant from Birmingham until 1865, and it is

feasible that he could have taken his grandson into his care.

The early education of Espin junior must, surely, have been influenced to some extent by the activities of his father at the time. The Revd. Thomas Espinell Espin was Professor of Pastoral Theology at Queen's College, Birmingham from 1853 to 1865 and then Warden from 1865 to 1873, but in plurality he was Rector of Hadleigh in Essex from 1853 to 1868 and next Rector of S. Hilary de Poitiers at Wallasey, Cheshire, from 1868 to 1885. This being so the father would be resident at Birmingham at least during college terms and most probably visited his benefice in vacations. The situation was curious by the standards of to-day, but the practice of holding livings in absentia was a feature of the Church of England in times past and it evidently persisted in this particular case.

Resort must now be made to surmise. The balance of probability is that until his fourth of fifth year Espin would pass his infancy in maternal care at Birmingham for the greater part of the time. Thereafter the school of his grandfather or a similar private establishment near home would be chosen. With a father so eminent in the Established Church, young Espin's education, it may be assumed, would be on classical lines and guided by this parent. Whatever tuition was afforded must have been sound and well-received by the pupil since Espin was only fourteen years old when he left the parental home to become a boarder. With this step taken his childhood, as such, came to an end and youth began.

It was in fact, in September 1872, when Espin entered upon his studies at a public school. That chosen for him was Haileybury and Imperial Service College at Hertford - a foundation identified with the former East India Company - which had been established ten years earlier. He became a pupil in Edmonstone House where he remained until his course ended in July 1876.

Until this time Espin had not shown any particular leaning towards a hobby or pursuit apart from his usual school work and one would not, normally, expect such to be manifest in a permanent sense at so early an age. However, it so happened that one of the masters at Haileybury was the Revd. Frederic John Hall under whose influence Espin came in the classroom. Mr. Hall had a keen interest in astronomy and at the material time the college possessed a wooden hut which housed a telescope : the hut being placed directly in front of the stone facade of the building where its prominence rather detracted from the elegance of the main structure. As a consequence of talks by this tutor Espin took a liking for astronomy and it may well be imagined that with an instrument at hand he would avail himself of its use, probably under the supervision of his mentor.

This pastime developed as a diversion from his academic work until the Spring of 1874 when an event of considerable note occurred. On the 17th April of that year M. Coggia of the Marseilles Observatory discovered a new comet. It was at first a telescopic object beyond the reach of the naked eye until June 1874, and by July it became a dazzling object with a curved tail. On the 27th June it occupied a position in the northern heavens where it formed the lowest vertex of a triangle in which

α Ursae Minoris (Polaris) and α Ursae Majoris lay at the other angles, and its tail extended for the greater part of the distance from the horizon to the zenith. It was, in fact, the first comet sufficiently brilliant to enable a thorough spectroscopic examination of its nucleus to be made, and prominent astronomers such as Huggins, Fr. Secchi, and Ranyard gave it detailed attention.

What had hitherto been a pleasurable pastime forthwith developed into an absorbing interest which was to endure for the rest of young Espin's life. Not only Espin and the Revd. Mr. Hall were impressed : the scientific society of the day echoed with discussion and papers continued for a year or so afterwards. At this point it is pertinent to mention that the loose expression 'Coggia's Comet' is often found in Victorian astronomical literature and confusion may be caused thereby. M. Jerome Coggia discovered eight comets altogether ,(1) that which aroused the interest of Espin being the fourth and it is usually designated as 1874 III . Most probably Espin would examine the later ones but none of these had anything like the same effect upon him.

By the time Espin's stay at Haileybury came to its end he was a committed astronomer. Only eighteen months later, on 11th January 1878 to be precise, he was, at the exceptionally early age of nineteen years, elected to a Fellowship of the Royal Astronomical Society. He thus became one of the youngest persons ever to achieve this distinction. (2)
In so doing he outpaced the Revd. Frederic John Hall who, still at Haileybury, secured election to a Fellowship on 8th March 1878 some two months after his former pupil. (3)

Espin, His Life and Work

An examination of the scientific journals of 1876 has brought to light the first Press contributions on astronomical matters made by Espin and they prove to be interesting, particularly as he employed the device of initialling his material instead of appending the usual signature.

In the 'English Mechanic' of 7th April 1876 there appeared a letter from a correspondent above the initials W.G.P. which, inter alia, referred to the star tarpezium θ Orionis, and a fortnight later in this journal other letters were printed on the same topic. Two weeks afterwards, in the issue of 5th May 1876, there occurred a letter with the subscript T.E.E. in which were detailed the observations made by its writer on θ Orionis. Evidence is substantial that the initials T.E.E. were those of Espin who at that time was seventeen years of age. In later correspondence in the same publication he answered various enquiries and went on to contribute further notes on observations of the Moon and on a double star in the constellation Lyra. At the time Espin was carrying out observational work with a 3-inch achromatic telescope made by Large.

When one realises that those with whom Espin was corresponding through the pages of the 'English Mechanic' were of some calibre, one at least being a Fellow of the Royal Astronomical Society, it becomes apparent that he had a firm grasp of the work in which he was engaged. Moreover it would be consistent with his position as a youth at Haileybury that he should apply initials to his Press contributions in order to avoid any recoil on himself which the publicity of his full name and address could have produced.

During the decades which elapsed after Espin left Haileybury his work in scientific matters generally and in astronomical ones in particular attracted ever increasing recognition and, as is related elswhere, his published material in several countries grew to large dimensions. Any college is proud of its eminent alumni and it is satisfying in this respect to learn from the pages of 'The Times' some months before Espin's death in 1934 that the authorities at Haileybury sought to honour him by having his portrait painted in order that it might hang adjacent to that of Field Marshal Lord Allenby 'as the two most famous men it had turned out' . (4)

This intention was never fulfilled, for whilst a portrait of the Field Marshal by Oswald Birley is displayed there is no corresponding portrait of Espin.

Apart from the Revd. Frederic John Hall the friends he made initially included the Revd. Herbert Sadler, a very well-known amateur astronomer (who caused Espin acute embarrassment on one occasion as will be related later), and Prebendary T.W. Webb whom he first met in 1876, and whose book on celestial objects he helped to compile in its early editions and to re-edit in its later ones. Professor Charles Pritchard, the Savilian Professor of Astronomy at Oxford became Espin's patron upon hearing of his work with the telescope whilst an undergraduate.

As time advanced Espin's prestige increased and many more came within his ambit. Some achieved fame such as Professor E.C. Pickering of Harvard College Observatory and Sir Howard Grubb the renowned telescope maker, but at this stage it is enough to show that even in his youth he was a well-educated person in an assured position with a university career ahead and

a widening circle of accomplished people around him. Fortune indeed smiled upon him : later she was to beam.

Between leaving Haileybury in July 1876 and the month of January 1878 Espin does not seem to have attended any educational establishment. It could have been the time when he acquired his musical training at the hands of Sir Walter Parratt who was Organist of the Chapel Royal at Windsor and Master of the Queen's Musick. He certainly pursued his observational work and presumably studied the subjects of his future course at Oxford, for at the latter date he matriculated at Exeter College. He was destined, after the manner of his father, to seek ordination in the Church of England, and so followed the theological course for an Arts degree.

This month - January 1878 - was propitious for Espin. He was nineteen years old, an F.R.A.S. , and just accepted as an entrant to England's senior University. He stood on the very threshold of manhood : how he applied his talents and availed himself of the opportunities thus presented can now be narrated.

References :-

1 JBAA : 1918-1919 : XXIX : p. 84.

2 MNRAS : Jan. 1878 : XXXVIII : p. 89.

3 MNRAS : Mar. 1878 : XXXVIII : p. 225.

4 THE TIMES : Sat. 24-3-1934 : p. 8 : Dolphin's letter on 'An Astronomer in his Vicarage' .

CHAPTER III

OXFORD : DIACONATE : PRIESTHOOD : CURACIES AT WEST KIRBY , WOLSINGHAM , AND TOW LAW

The duration of the course for an Arts degree at Oxford extended over three years and both Latin and Greek were essential entrance requirements of the University at the time. Since it is known definitely that Espin matriculated at Exeter College in January 1878 and completed his work satisfactorily he would probably leave at Easter or Midsummer of 1881.

At this point an odd circumstance appears. Espin senior had been scholar, fellow, and tutor, at Lincoln College Oxford, and it would have been an easy and natural step for him to have arranged for the admission of his son to that institution. In the event he did not do so, but chose Exeter College instead, so the question is posed as to why he followed this unusual course.

The answer may well have lain in the Senior Common Room at Lincoln which Espin the elder would frequently use and inevitably come into contact with Mark Pattison, who, after holding a Fellowship for twenty one years (1840-1861) became Rector of Lincoln College in 1861. It is well known that Pattison was violently anti-clerical and had scant regard for most of the other Fellows. The college itself was effete and it is quite possible that Pattison's attitude combined with the general atmosphere of the place caused the younger Espin to be directed to Exeter College. (1)

For ordinands of the Church of England, of which Espin was one, the academic work would be chosen so as to fit him for

this vocation. He studied theology as would be expected. and it is to be noted that no science was required. When he graduated B.A. his placing was in Honours Second Class, but it was conveyed to him in an aside that he would have secured a First Class had he taken the Hebrew paper at Finals.

To be an Oxford graduate in 1881 was a solid ground of recommendation for one seeking ordination in the Established Church. To be also the son of a father who was a canon of that church and chancellor of two dioceses in addition, made young Espin's acceptance a virtual certainty. Even so it was, and still is, customary for ordinands to undergo specialist training at a recognised seminary such as Cuddesdon or Mirfield and to submit themselves to the examining chaplain of the diocese in which they sought to minister. Espin's own father was such an examiner in the diocese of Chester for Bishop Jacobson (1865-1884) and for Bishop Stubbs (1884-1888).

No data have been discovered which would enable Espin's pastoral training positively to be identified. Queen's College at Birmingham with which his father was associated as Professor of Pastoral Theology (1853-1865) would be a possible venue. The most which can be said is that it is probable he did submit himself to this discipline and such must have occurred between Easter 1881 and his admission to the diaconate of the church in 1882. A year later, in 1883, he was consecrated priest in Chester Cathedral by the Bishop of the diocese.

In order that a mental view of Espin's later career may be correctly formed recourse must now be made to events

which took place a little earlier than this, in the life of his father. The Revd. Thomas Espinell Espin relinquished the rectory of S. James-the-Less, Hadleigh, Essex, in 1868 and moved to a similar position at the church of S. Hilary de Poitiers, Wallasey, Cheshire. It was, therefore, a matter of great convenience when Espin junior became a deacon, for him to be assigned to a curacy of the nearby parish of S. Bridget, West Kirby, Cheshire - a post which he occupied for three years from 1882 to 1885. The Rector of West Kirby was Canon Thomas Eaton who held the living in plurality with the office of Canon Residentiary at Chester Cathedral, and Espin was one of three curates who assisted in the pastorate of the West Kirby parish. Espin senior had been an honorary canon of Chester since 1871 and must in consequence have been well known to Canon Eaton - a circumstance which tended to make living most congenial for his son.

The matter of ecclesiastical patronage now enters into affairs and it may be useful to explain this, for it, too, had a direct bearing on the migration of the Espins to the diocese of Durham in 1885.

In the Church of England there has existed for a very long period a system whereby a person or an institution can possess the right to present an ordained Anglican clergyman to a particular living. Such right is called an advowson and its owner is known as the patron of the living. Typical holders are the Crown, the bishops, universities and colleges, members of the peerage, and even private individuals. Now it so happened that the Bishop of Chester, inter alia, held the

advowson of S. Hilary de Poitiers at Wallasey. The Bishop also had, by right of his See of Chester, the patronage of the livings of the parishes of Bishopwearmouth, Frosterley, Longnewton, Norton, Winlaton, Wolsingham, Thornley, and Tow Law, in the diocese of Durham and indeed such are still held (1972) by the Bishop of Chester.

Espin's father, it may be reiterated, was an Examining Chaplain to the bishops of Chester for 23 years (1865-1888) and Chancellor of that diocese from 1873. The facile translation of Chancellor Espin and his son to Wolsingham in 1885, the former to be Rector and the latter to be a curate, is evident. Moreover the living of Wolsingham at the time was L.590 a year net (1972 equivalent = L.3,628 per annum) together with a free house. The population of this small country township was under 3,000 and two curates were provided, so in a word one could say that the Chancellor was given a virtual sinecure.

Barely three years later, in 1888, the Revd. Michael Henry Simpson, the first incumbent of Tow Law parish, died, and as the patronage of Tow Law was - as already stated - in the gift of the Bishop of Chester it need occasion no surprise to learn that one of the curates of the adjacent parish of Wolsingham i.e. the son of its Rector in the person of the Revd. T.H.E.C. Espin, was offered the benefice. From his ordination as deacon to the conferment of a living only six years had elapsed. This was a short spell indeed and one speculates on the influence which, even in the church, a distinguished father can exert in the preferment of his son.

The point just made is stressed by citing the case of the Revd. Thomas Bertram Weatherell, a native of Tow Law, who was

ordained deacon in 1909 and held curacies at S. Andrew, Monkwearmouth (1909-1911) and at Tow Law (1911-1935). A lapse of twenty four years occurred between Weatherell's diaconate and his preferment to the rectory of Jarrow Grange in 1935.

Little has been forthcoming as to Espin's pastoral work at West Kirby. He was, of course, but one of three curates attached to the parish which consisted of a seaside locality on the north-west of the Wirral Peninsula overlooking the broad estuary of the River Dee, Liverpool being ten miles or so eastwards and separated from the Wirral by the narrow channel of the Mersey. Whatever it was he never had the experience of being bound by long fixed hours of labour, and found time enough to engage in astronomical work quite extensively. He was near to his father's rectory at Wallasey - about five miles distant - and the laity amongst whom he moved were well-placed and mainly affluent. Indeed one of the churchwardens at Wallasey, Mr. James Harrison head of the Harrison Line of steamers, presented Espin with a 5-inch refractor - a munificent gift by any standard, (2) and when he left the parish of West Kirby in 1885 the parishioners made him a parting gift of L.35 (1972 equivalent = L.215) which sum he applied towards the cost of constructing and equipping a new observatory at Wolsingham. (3)

In Victorian times, and much more so to-day, the Wirral was the home of the well-to-do merchants of the port of Liverpool. The West Kirby area was mainly residential and its populace to-day would be considered as belonging to the middle and upper classes.

Into this society the young curate, an Oxford man, and son of a clerical dignitary of the diocese, fitted very well indeed. If ever he came into contact with the miseries of poverty, disease, drunkenness, and so forth which abounded in the heavily industrialised areas across the Mersey, it would be adventitious, and thereby his horizon would be constricted by the little he knew or experienced. He had not, by reason of background and training, any acquaintance with the sordid side of life and so would lack the more evenly balanced outlook on the world which one who had worked amongst such degradations would possess. To sum up it may be said that Espin began his career at the top for he never had need to work his way up from the bottom.

When the scene changed with his transfer to Wolsingham the leisured life became still more of a reality. There he was one of two curates in the parish, he had a benign father as rector and only a small Anglican community to serve. The Wolsingham steelworks, of modest size compared with urban counterparts, were the sole industrial activity and these apart the livelihood of the place was based on agriculture. It was a placid, contented, rural area, changing very little from one year to another, and a delightful spot in which to live.

By comparison, in 1972, there remain no curates at Wolsingham, the church cannot so much as afford the upkeep of its graveyard, and the rectory itself - wherein no trace of Espin's observatory exists - is divided in order to provide for a lay tenant.

The requirements of society in the 1880's were such

that the conduct of a priest had to be much further above suspicion than is the present day case. It was not thought proper, for example, that a curate should live in the same house as the rector, even when the relationship was that of father and son. Consequently Espin was obliged to take lodgings at Wolsingham, which he did in the house of Mrs. R.R. Morgan and now known as No. 26 Front Street. This, however, did not prevent Espin the curate from erecting an observatory in the grounds of his father's rectory, which structure must have been used regularly during the night hours. An interest in astronomy was considered to be entirely suited to a clergyman and when the work accomplished there became known the effect was to arouse much local pride.

A close friend of Espin, and a scion of the nobility was W.H. St. Quintin Gage who followed him to Wolsingham and took up residence quite near to Espin's lodgings .(4) He, too, erected an observatory to the rear of his house and the remarkable situation then existed that Wolsingham had two independent observatories functioning within a few hundred yards of each other.

But more remains to be told. There lived in Meadhope Street in Wolsingham a resident of modest education whose very independent character caused the people to regard him as a 'character' . He was named Amos Mitchell and his main pursuit was meteorology. Amos was held in good repute as the weather man of Wolsingham, and to him people would resort when they wished to learn the expected weather conditions a few days ahead - foreknowledge in regular demand by the farming community.

Amos Mitchell, W.H. St. Quintin Gage, and the Revd. T.H.E.C. Espin had interests in common and they formed a trio. The two astronomers and the meteorologist used the parish magazine in which to publish material thought by them to be useful to the inhabitants. The daily rainfall figures, day and night temperatures, and times of sunrise and sunset, were typical examples. Indeed this magazine also gave the postal arrangements and the daily train service from Wolsingham. Altogether it was a compendium of local information the like of which has nowhere else been found. Obviously churchwarden Gage and curate Espin engineered this venture between them. (5)

The translation of the Revd. T.H.E.C. Espin from Wolsingham to Tow Law took place in the Autumn of 1888, and on 6th October the teachers of the Boys Sunday School at Wolsingham presented him with a farewell address and a piece of plate. He was licensed officially to the perpetual curacy of the church and parish of S. Philip and S. James, Tow Law, by Act of Dr. J.B. Lightfoot, Bishop of Durham, executed on 27th August 1888 on the nomination of the patron the Bishop of Chester, the latter thereby asserting this right vested in him by his See of Chester. Espin's admission to the benefice took place in the church at Tow Law on the evening of 17th October 1888 at a special service. The curate sent to aid Espin at Tow Law, the Revd. William Downard, previously at Etherley, was granted a licence to officiate as curate in the Tow Law parish by Bishop Lightfoot on 29th August 1888, and he took up residence there just before Espin commenced his incumbency on 21st October 1888. (6)

The phraseology of ecclesiastical preferment is akin to that used in heraldry in being a descriptive language of its own.

The Act Book of the Diocese of Durham records that Espin was 'licensed' to the Tow Law benefice and at the subsequent religious service at Tow Law church he was 'admitted' . This was so because the office to which he was appointed was that of perpetual curate. In the case of a rector or vicar one of two alternative procedures would have been necessary. If the diocesan bishop was the patron of the living then the clergyman would be accorded collation and induction. If the patronage was not in the hands of the diocesan then institution and induction were prescribed.

To-day (1972) there remain no perpetual curacies in the Church of England : they were abolished by the Pastoral Measure of 1968 which came into force on 1st January 1969. Part IV, clause 87, of this Measure converted all existing perpetual curacies into vicarages. An explanatory note on these quaint procedures is, for interest, included in the dossier. (7)

The installation of an incumbent is accompanied nowadays with much the same basic ceremonial as has been observed for decades, but by and large it excites far less interest than it did in Tow Law in 1888. At that time it stood out as a special occasion of grandeur and colour in a drab township whose very source of livelihood was faltering. It was accompanied by the music and singing of massed choirs in the presence of many robed clergy and attracted a full congregation.

Espin's actual admission was carried out by Archdeacon Long who acted with the Commission of the Bishop : the Oath of Allegiance was administered by the Legal Secretary of the diocese and the churchwardens performed their required offices, one of

which was that of witnessing the tolling of the church bell in token of his temporal possession of the church fabric. Clergy from the neighbouring parished of Thornley, Stanley Crook, Satley, and Wolsingham, were present and the combined choirs of Tow Law and Wolsingham parishes sang in unison. The ceremony is detailed in the accompanying extracts from the Wolsingham Parish Magazine. (8)

Thus at the age of thirty years the Revd. T.H.E.C. Espin became established at Tow Law in 'real, actual, and corporal possession' of the church of S. Philip and S. James. In this secure living he was destined to remain for the rest of his life, the remarkably long period of forty six years, during which interim by far the greater part of his astronomical and allied work was accomplished, the particulars of which may now be examined.

References :-

1 S : p. 58 and p. 79.

2 MNRAS : Feb. 1935 : 95 : p. 319.

3 WOR : 1890.

4 A note as to the exact positions of the dwellings of Espin and Gage is included in the dossier.

5 WPM : 1888 : p. lxxxii and p. lxxxv. (Nov)

6 AB : 1888 : p. 337.

7 For an explanation of these ecclesiastical forms see the note in the dossier.

8 WPM : 1888 : p. lxxxiv. (Nov)

CHAPTER IV

MEMBERSHIP OF ASTRONOMICAL BODIES

In addition to his Fellowship of the Royal Astronomical Society Espin was active in three other organisations, namely, the Liverpool Astronomical Society, the British Astronomical Association, and the Newcastle Astronomical Society. Of these his connection with the Liverpool society was first in order and the most intimate. This chapter which deals with all three will therefore commence with Espin's inaugural efforts when the Liverpool enterprise was launched.

THE LIVERPOOL ASTRONOMICAL SOCIETY

Wallasey Rectory was the home of the Espin family from 1868 until 1885, and T.H.E.C. Espin, the son, lived there from the age of ten years until he was twenty four, after which he resided nearby as a curate at West Kirby for another three years. He moved to Wolsingham at the age of twenty seven.

Altogether, therefore, he dwelt on the Wirral Peninsula of Cheshire for seventeen years which extended from childhood, through youth, to manhood. Of course he would be absent at Haileybury during term time when a schoolboy and again away from home whilst at Oxford, but even allowing for these interruptions his vacations would be spent largely at the rectory and he must have grown up with a knowledge of the area and because of his father's eminence he would most likely have an acquaintance with many of the leading people in it.

It is appropriate, now, to look briefly in retrospect at the astronomical work of T.H.E.C. Espin up to the time when the Liverpool Astronomical Society was formed. At Haileybury

as already recounted his interest was prompted by his form master the Revd. F.J. Hall and further stimulated by the appearance of Coggia's comet (1874 : III) in 1874. He began observing with a pair of opera glasses, then he acquired a 1-inch Dollond telescope (1) and in 1876 added a 3-inch refractor made by Large. In that same year he made his first press contribution on an astronomical topic. (2) At Oxford Prof. Pritchard permitted him to use the 13-inch de la Rue refractor at the University Observatory, and he was elected F.R.A.S. in January 1878. At Wallasey a churchwarden gave him a 5-inch refractor. He had also made friends with a number of well-known amateurs of his time - the Revd. T.W. Webb and the Revd. Herbert Sadler being instances. In fine, he was full of promise- he had been well nurtured.

The first mention of a projected society is contained in a letter from Espin to the English Mechanic which was written from Wallasey Rectory during Christmas Vacation 1879. In it these words appear .....'The great misfortune seems to be the total lack of any organisation. We have instruments enough, and competent amateurs enough, but nothing is done except in isolated cases, from want of direction. Fibres, which are powerless in themselves, yet become a strong rope when blended together. I have a dim recollection of hearing of an Amateur Astronomical Society years ago, but I don't know what became of it. Probably it came to grief through want of members. But now every year fresh recruits enter the field, the number of amateur telescopists increases vastly, and I think there would be no lack of support now. In saying this am I expressing the thoughts of other

readers ? Sometimes I have letters which show nearly the same feeling of isolation that I used to experience when first I commenced star-gazing, and it would be very interesting to know whether some society could be formed for drawing closer the ties between us brother star-gazers, and whether it would be well supported and approved of by astronomical readers of the E.M. generally' ..... (3)

This quotation of Espin shows how earnestly he wished to start an astronomical society even as an undergraduate. In 1881, the year in which he left Oxford, the Liverpool Astronomical Society was formed with Espin as a founder member. There are no records in the Minute Book of the Society giving the inaugural details but it is thought that it first took the shape of a branch of the Association of the Literary, Scientific, and Art Societies of Liverpool which met in rooms at No. 175 Islington, Liverpool, probably with Espin as President.

On 19th April 1882 Espin read a paper before the Liverpool Astronomical Society entitled 'What to observe and how to observe it' . Later this was printed in the English Mechanic. (4) It is thus evident that the Society was in existence at such time and that Espin's customary practice of communicating his astronomical activities to the press had begun.

In seven successive issues of the English Mechanic published during July and August of 1882 there appeared in weekly parts a catalogue of suspected variable stars which included 343 objects all told. The authors of this work were T.E. Espin, W.H. Gage, and T. Read. Now whilst no reference at all is made to the Liverpool Astronomical Society in the presentation of the data, it is known positively that

the first two persons were in the Society and the third presumably so. The inference is that all entered upon observational work with a great deal of enthusiasm to produce the results they did, and their zeal augured well for the new society.

The first definite entry into the Minute Book is dated 9th September 1882 when a field day was held at West Kirby at the invitation of the Revd. T.H.E.C. Espin (for he was then a curate in that parish) and at the Annual General Meeting which followed a motion 'that this society should form an independent association' was carried unanimously. The officers elected for the 1882-1883 session included Mr. R.C. Johnson F.R.A.S. as President, and the Revd. T.H.E.C. Espin B.A., F.R.A.S., as Vice-President. (5)

The progress of the Society seems to have gone from strength to strength. On 20th December 1882 there appeared No. 1 of the Transactions of the Liverpool Astronomical Society, which contained a history of the discovery of the comet of 1882. This publication was really an account of a lecture given by Espin in a schoolroom at West Kirby in the early winter of 1882-1883, and a copy is included in the dossier. During the next month - January 1883 - he lectured the members again on the topic 'Some New Double Stars' (6), and on 9th April 1883 the post of Observer to the Society was given to him on the unanimous decision of those present at the meeting. (7)

In the account of this April meeting it is mentioned that the membership stood at between sixty and seventy persons, and that a paper then read by Mr. W.H. Davies, the secretary,

it was decided, 'should be printed entire in the abstract of proceedings published after each meeting' .

How temptingly easy it is to be wise after an event. Such an accusation, if forthcoming, has to be weathered in making the following comment. Here was a very young society with just over sixty members, in fact barely a year old, and financed by modest annual subscriptions of 5/- per member, actually printing Proceedings and issuing its own publications on much the same lines as the learned and chartered bodies of the metropolis. Surely its officers, had they possessed even a modicum of business sense, should have seen that they were overreaching their slender means. But they did not. Quite literally their eyes were set on the heavens and not so much on the mundane affairs of the society, which as a result, worsened. Unfortunately the awakening was not yet : matters had not degenerated far enough.

To proceed. By the month of May 1883 the society had its own Observatory in Church Road, West Kirby, and Espin addressed letters to the press from there. (8) On the 21st of the month the Revd. J.J. Muschamp Perry (Vicar of S. Paul's, Alnwick, Northumberland, and a noted amateur astronomer) addressed the society on his observations of Jupiter with an 18-inch reflector : Espin also spoke on his observations of the variable star U Monocerotis made in the society's own observatory, and he recounted that he had devised a photometer with which to make them. Most impressive of all it was announced that Prof. E.C. Pickering of Harvard College Observatory, U.S.A. was to speak to members during his forthcoming visit to England (9), and in fact he did so at a meeting on 26th September 1883.

For the next eighteen months or so Espin featured prominently in the affairs of the Society. He continued his press contributions from the West Kirby Observatory on various matters e.g. his new photometer (10), the flourishing state of the Liverpool Astronomical Society, its programme of observational work for the session 1883-1884, and the colours of the stars. He gave lectures on the actinic light of the stars, the cause of stellar variation, and stellar photography. The rise of the Society was so rapid that Espin wrote a eulogy on it in the English Mechanic in May 1884. (11)

In December 1883 on the proposal of Espin, Howard Grubb Esq. (later Sir Howard Grubb F.R.S. a famous telescope maker) was elected an Associate Member of the Society (12), and he most generously loaned to its observatory a 4·5-inch aperture stellar camera on an equatorial mounting and fitted with clockwork motion. Grubb was a valued member : he gave the Society a detailed procedure for the adjustment of equatorial telescopes at a meeting on 13th October 1884. At that time Grubb would rank amongst the world's leading authorities in this particular field. (13)

Mr. George Calver was another liberal friend. He was a specialist in the figuring of specula and the excellence of his work became legendary. Calver lent the Liverpool Astronomical Society a 9-inch reflector which Espin used at West Kirby.

Not only did Espin and the officers of the Society read papers : other events occurred so quickly that they outrun a sedate rendition. To name a few of them :- The Society greatly expanded in numbers and took in persons from a very wide area, so that only a small nucleus lived locally and attended meetings whilst the greater bulk were kept in touch with affairs by the circulation

of abstracts of proceedings at meetings. Next it established a class of Associate Member on a broad basis and elected to it most of the astronomers of any note, examples being Dr. Gould the Director of the Cordoba Observatory, Dr. Huggins, Fr. Perry of Stonyhurst, and - somewhat boldly - the President and the entire body of officers of the Royal Astronomical Society.

In the field of observational astronomy proper it established half-a-dozen Sections (Planetary, Lunar, Solar .... etc) each headed by a Director. Espin had personal charge of the Variable Stars Section : this, of course, being additional to his existing post as Observer to the Society (14). In order to record all these happenings the monthly 'Proceedings' grew from a modest eight pages originally to twenty-eight.

On the 10th November 1884 with Espin in the Chair a meeting of the Society was held at which Mr. W.H. Davies the secretary uttered forebodings on the future. They were in 'some financial difficulty' at the root of which were the mounting costs of their publications. It was agreed that advertisements should be accepted for insertion in the Society's 'Journal' as the vehicle of their future abstracts was to be called. The matter being thus passed over the meeting went on to hear the usual papers. (15)

The Presidency of the Society went to Espin for the session 1884-1885, and one rather interesting event took place at a meeting on 8th December 1884 which was of sufficient moment to warrant particular attention. When Prof. Pickering delivered his lecture at Liverpool on 26th September 1883 (of which notice has already been taken) he referred to the variation of light absorption from stars by watching them and comparing their

brightnesses when on the horizon and when in the zenith. He went on to remark that he had been able to do this himself whilst travelling 'on the Rhigi' and he expressed the hope that any member of the Society who was in a position to do so would attempt this work.

The hint was taken up by Espin. The Rhigi, or more correctly the Rigi Scheideck, was the name given to a peak nearly 6,000 feet high near Lake Luzern in Switzerland and Espin spent the month of July there during the following summer (i.e. 1884) where he made a number of observations along the lines suggested by Pickering. These he passed on and the result was that Pickering submitted a paper to the Liverpool Astronomical Society on 8th December 1884 entitled 'The reduction of observations for atmospheric absorption at low altitudes'. It is thus evident that the status of Espin in the astronomical world of his day must have been substantial : otherwise a professor of astronomy at Harvard would scarcely have based a paper on such material had he not been able completely to trust in its accuracy.

The year 1884 saw, also, the publication by the Liverpool Astronomical Society of 'A Catalogue of the Magnitudes of 500 Stars in Auriga, Gemini, and Leo Minor' compiled by Espin at the West Kirby Observatory in his capacity as Special Observer to the Society. A copy is included in the dossier.

The events of the year 1885 now come under review. In April Espin described to the members an interesting occulting eyepiece which he had recently tested, and even at this remote date (1972) it is full of interest. It was a Ramsden eyepiece fitted with two pairs of moveable shutters at the focus, and it was particularly useful in examining the fainter of the stars

in a pair. In fact by its use Espin discovered a new companion to 27 Hydrae. (16)

During the month of May he presented a paper on 'The Probable Period of the Variable star LL. 14551' which had been under observation since 1883. The published material issuing from the West Kirby Observatory of the Society at this time, due to Espin, mainly related to variable and red stars, and stars in the Milky Way, but it was short-lived for in September 1885 he announced his change of address to High Street, Wolsingham, in the County of Durham, whence he had moved upon taking up his new post as a curate of that parish.

Although henceforward Espin lived well over a hundred miles distant from Liverpool his interest in the Liverpool Astronomical Society remained keen. It took only a short time for him to have erected an observatory in the grounds of the rectory for in this he was fortunate in having at hand the skilful help of the Landreth brothers who were contractors at Wolsingham. Mr. George Calver, one of the foremost speculum makers, related in October 1885 that he had supplied an equatorially-mounted 17·25-inch reflector with a driving clock which was housed in this new structure, (17) and by January 1886 Espin had employed the new instrument to re-observe some new orange and red stars previously detected with the 9-inch Calver equatorial at West Kirby. (18) He also confirmed Gore's Nova in Orion with it and re-observed the variable P i Leporis with a 3-inch refractor - used on this particular occasion because the 17·25-inch instrument was snowed up. (19)

Whilst this work was proceeding at Wolsingham there had

been developments at Liverpool. Upon Espin's departure the post of Special Observer had been taken over by the Vice-President, W.H. St. Quintin Gage, for a short time but Espin was re-elected to it in February 1886, (20) and at the fifth annual general meeting held on 17th July 1886 he was elected President and Special Observer for the ensuing session 1886-1887.(21)

The vigour displayed by Espin in astronomy and especially the regular appearances of his published material both privately and under the aegis of the Liverpool Astronomical Society had inevitably brought him into prominence. Such led to an incident in 1886 which, for the sake of completeness, is now recorded.

It is commonly the case when a new organisation of any moment is formed that efforts are made by its promoters to indulge in what may be termed window-dressing by seeking to gain the patronage of eminent persons whose names it can display in an endeavour to secure some prestige in the public eye. Espin's repute in 1886 was such that an association with the grandiose title of 'The Society of Science, Letters, and Art, of London' conferred upon him the honorary title of F.F.Sc. for 'his valuable work in astronomy'. Evidently the sponsors were not aware of the restricted usage of the title 'Fellow' or they would otherwise have chosen another designation. (22)

An announcement of the matter in the press called forth some biting comment from Capt. W. Noble (the doyen of amateur astronomers who regularly contributed to the pages of the English Mechanic, using the pseudonym F.R.A.S.). He wrote .....'what on earth is 'The Society of Science, Letters and Art, of London ?. The association with this very pretentious title is not to be

found in the exhaustive list published in 'Whittaker's Almanack', and it rather looks as though it were trying to confer some vicarious honour on itself by proffering such as it can offer to a man like Mr. Espin' ..... (23) . This criticism evoked no reply.

Espin's own reaction was quite different. He was susceptible. The addition of a further label apparently pleased him and on the frontispiece of Publication No. 1 of the Liverpool Astronomical Society's Observatory in 1887 he appended F.F. Sc. to his other qualifications. The whim was short-lived for the dubious honour later ceased to to displayed. It had been a worthless - but decorative - distinction.

The main theme resumes at Wolsingham in the first few months of 1886. At this time Espin adopted the practice of issuing circulars to those astronomers and observatories which were regularly in touch with him, and in so doing he followed a custom already well-established. The Dun Echt Observatory for example had for long been doing this and sent out its circulars Nos. 118 onwards during the same year.

The first 'Circular of the Liverpool Astronomical Society, subscribed by Espin as its Special Observer and originating from Wolsingham, appeared early in the year and four had been issued by June 1886. A further six at least appeared before the end of that year. They were terse notes, often concerned with a specific item and occupying only a few lines of print on an octavo sheet. No. 1 gave an ephemeris for 10 Sagittae, No. 2 suggested a variability in the star D.M. +8°.3780 ..... and so on, They continued

under this title until Circular No. 16 in 1887, and from then onwards the description 'Wolsingham Observatory Circular' was adopted, the reason for which change will appear presently.

Quite apart from topics contained in the circulars the routine observationsl work at Wolsingham continued on a number of variable stars such as 11 Canis Major and B 277 Virginis. Espin made a detailed examination of the colour and magnitude of Nova Andromedae which he published in April (24) but it does seem that the variables held his main interest. At the first meeting of the 1886-1887 session of the Liverpool Astronomical Society held on 11th October 1886 he delivered his Presidential Address on 'Stellar Variation : a Chapter in the World's History'. At this same meeting the Society elevated Espin to the class of Associate Membership and thereby installed him amongst their revered ones.

The summer of 1886 had been darkened, figuratively, by discord in the Society. Mr. Isaac Roberts F.R.A.S., President for 1885-1886, at the last meeting of the session held on 11th May 1886 made a statement of some gravity when referring to the affairs of the Society and this most unfortunately found its way into the public press. (25) In sum he pointed out that only a quarter of the members lived in the Liverpool area, that the founders (of which Espin was one) had created far too much correspondence and literary work from which they had later withdrawn their assistance, that liabilities had been incurred beyond their means to discharge, and finally that the annual subscription of 5/- was too small to cover their printing and other expenses. He invited members to convey their views of these things to the secretary during the summer recess.

How thin is the veneer of civilization and how degrading a spectacle it is to witness public recrimination when matters go awry. To the remarks of Roberts other members of the Society responded in the press : first Espin, Franks, and Goodacre, followed by Johnson and Davies. All were self-justifying and all were derogatory of others. It is to be hoped that the folly of this turbulence became apparent or so it seems for some at least of the participants were elected to office for the 1886-1887 session, including Espin as President and Special Observer. Nothing further was heard of Mr. Isaac Roberts : his voice of reason was apparently submerged in the welter or argument. (26)

In January 1887 a letter from Espin addressed from 'The Liverpool Astronomical Society's Observatory, Wolsingham' appeared in the English Mechanic. (27) This particular contribution was interesting because of his use of this style of address and also by reason of a detailed description it contained of a direct vision spectroscope of his own devising which he had employed in examining the light from U. Cygni. Later in the same month he published an account of the technique employed for his stellar photography using the camera of 4·5-inch aperture lent by Sir Howard Grubb in 1883 when Espin was at the West Kirby Observatory. (28)

Both spectroscope and camera were well used during 1887 in conjunction with the 17·25-inch reflector. These were the instruments which enabled Espin to derive the data contained in Publication No. 1 of the Liverpool Astronomical Society's Observatory which bore the title 'Photographic Photometry and Spectroscopic Observations' , a copy of which is

in the dossier. It was the fruits of much labour. Espin used the camera to make a pair of magnitude determinations of 1,491 stars in the zone +40° 0h. Vh. and by use of multiple direct vision prisms he examined the spectra of typically red stars which he numbered 142 to 185 so as to make the numeration consonant with his red star list upon which more detailed comment will be made in the section devoted to those objects. He paid the printing costs of this modest booklet of eleven pages himself and placed copies on sale at 1/6d each. By adopting this procedure the Society was relieved of expense and only those who were willing to pay obtained the publication.

Espin's last paper entitled 'Unpublished Red Stars' was read before the Liverpool Astronomical Society on 1st February 1887. In this he named 33 new red stars, some of which he had observed with the 17·25-inch Calver reflector. His health was indifferent at this time and it was conveyed to the Society that thereafter he would be unable to be as active a member as formerly. Following upon this he resigned his Vice-Presidency of the Society on 6th September 1887, after which date the style of address previously mentioned was dropped. (29)

The reflector served as Espin's stellar probe for with it he sought out a variety of new details not previously noticed, the variabilities of a star near to θ Tauri, another close to o Cassiopeiae, S. Orionis, and a new variable in Canes Venatici, are all instances of his observational work during 1887–1888. His short-lived Vice-Presidency for 1887–1888 commenced with his election to it on 9th May 1887, and on 8th July he chaired the annual meeting of the Liverpool Astronomical Society held at Burlington House, Piccadilly, London, by grace of one of its

permanent occupants i.e. the Royal Astronomical Society - a venue of great distinction.

In the course of the meeting at Burlington House Espin referred to work which he was doing at Wolsingham in observing and re-observing red stars in preparation for a new edition of Mr. John Birmingham's catalogue commonly known as 'The Red Stars'. This, he made very clear, was in fulfilment of Section 3 of the Rules of the Liverpool Astronomical Society which required its Special Observer to undertake some systematic work during his tenure of office. (30)

The home-made spectroscope enabled him to obtain the spectra of stars down to the ninth magnitude and much of his research had been published in Astronomische Nachrichten. The revision of this well known inventory of the red stars by an Irish astronomer was one of Espin's major accomplishments and an outline of this self-imposed task will now be given.

Red stars invariably form an absorbing study for they can display variations in both colour and in magnitude. Anciently Sirius, now an intensely white star in Canis Major, was described as red. This class of stars was a particular interest of a Danish astronomer Schjellerup and he originated a list of them in 1866 (31). Ten years later Mr. John Birmingham of Millbrook, Tuam, County Galway, an astronomer and musician, prepared a catalogue of red stars and read a paper thereon at a meeting of the Royal Irish Academy on 26th June 1876. Subsequently his 'Observations and Catalogue' containing data on 658 red stars was published, in 1879, in the Transactions of the Academy (32). For this classical work Birmingham was awarded the Cunningham Medal of that institution in January 1884.

Later events were summarised in Espin's own words (33) .....'Mr. Birmingham, on his deathbed, wrote to the Revd. T.W. Webb, requesting him to undertake the new Edition of the Red Stars. Mr. Webb being unable to spare the time, placed it in the hands of Dr. Copeland. At the end of April 1886, Dr. Copeland finding that it would be impossible for him to do it, wrote to me requesting me to undertake it. This I did the more willingly that the Revd. T.W. Webb had expressed a wish that I should assist in the New Edition. Arrangements were at once made for devoting the 17•25 equatorial reflector exclusively to this work. At the same time requests were sent to various gentlemen at home and abroad for observations either of objects already known or of new ones ' .....

Espin further remarked .....'The telescope used since 1885, Sept., is a fine equatorial Newtonian reflector of 17•25 inches aperture, with circles reading to five seconds of time and single minutes of arc. It is fitted with a driving clock, slow motions, etc. The sweeping power has been used almost exclusively, and magnifies 70 times. It has a field of 45' ; occasionally higher powers of 100 ; 200 ; have been used' .....

The first quotation provides the information that Espin assumed his task in April 1886 and it is known that he read a paper on this work before the Royal Irish Academy on 11th June 1888, which was followed by the publication of his new edition of 'The Red Stars' as No. V of the Cunningham Memoirs of the Academy. The edition contained over 200 pages and in it particulars are given of 1,472 stars of which 766 are classified as red, 629 as ruddy, and 77 more are included in addenda. (34) Even with the splendid instrument described above : the acknowledged

assistance received from fellow astronomers and from a young pupil at Wolsingham named Nicholas Brown; the labour of compilation and collation of results must have been very great.

Upon close examination of this 1890 edition some curious features appear which now (1972) can only be made consistent with the general body of Espin's work by resorting to probabilities. He states, specifically, that his revision of Schjellerup's stars began in 1872 on the request of the Revd. T. W. Webb. If this be true then Espin was fourteen years old at the time and about to enter Haileybury, or indeed had just entered, as a boarder. It seems incredible that at so young an age he would be asked by Webb to undertake the re-observation of red stars measured by an astronomer of the standing of Schjellerup only six years earlier.

In referring to star No. 118 in the new edition of the catalogue, which was noted by Schjellerup as red, Espin mentions that .....'since February 2, 1873, it has always appeared to me bluish or bluish white' ..... (35) which reinforces the impression that Espin did, in fact, carry out systematic work in the observational field from his early teens onwards.

By comparison with the foregoing the paper read before the Royal Irish Academy was based on notes of four years' work by Espin i.e. the years immediately preceding the presentation of the paper, and therefore covering the interim 1884-1888, which in itself does not accord with the duration of the task taken over from Dr. Copeland in 1886 and completed two years later.

A reconciliation of these divergent points can be brought about by presuming that Espin's observations began in 1872 before he entered Haileybury - probably using opera-glasses - and that he

followed a consistent practice of noting stellar features throughout the succeeding years, included amongst which items would be data on red stars. When Copeland passed on to him the task of revision of Birmingham's catalogue 'The Red Stars' in 1886, Espin would then have these at hand together with recent and more exact notes accumulated at the West Kirby and Wolsingham observatories from 1883 onwards. Supplementing the above would be the particulars supplied by collaborating observers, and Espin's task would be that of assembling material in the two years 1886-1888 required for his paper read before the Academy in 1888.

At the advanced age of seventy years Espin wrote his last letter to the English Mechanic (36) in which he dwelt in reminiscent mood on his lifetime of work at the telescope. In that letter occurred the words .....'I am now in my fifty-fourth year of amateur astronomical work' ..... , meaning, of course, that he commenced at the age of sixteen. This, therefore, conflicts with his statements made in the 1890 edition of 'The Red Stars' but only by two years. It is surely charitable to infer that the declining faculties of age account for the difference and this is done in justifying the presumptions made.

The 1890 revision of Birmingham's catalogue of red stars is so typical of Espin's work that, by the kindness of the Librarian of the Royal Irish Academy, a copy is included in the dossier. It will well repay perusal.

A return to the main discourse now has to be made. i.e. to the state of affairs in the late summer of 1887. For the 1887-1888 session the Liverpool Astronomical Society had 440 . members and associates. The last Emperor of Brazil - Don Pedro II was, in fact, an Associate, and branches had been

established in Pernambuco, both Western and Southern Australia, and in the nearby Isle of Man. Progress indeed and ambition worldwide. Espin's activities were not particularly prominent as in former years after he had vacated the Vice Presidency, although he did identify a new star near to α Cygni on 8th May 1888 : no doubt his preoccupation with the impending new edition of 'The Red Stars' largely accounted for this.

Nothing further is to be found for a year or two more until April 1889, when a report in the English Mechanic gave the news that Espin's name had been struck out of the membership list of the Liverpool Astronomical Society (37), and once again unpleasant letters appeared in the press involving Isaacs and Espin - both members of the Society. However, upon the name being restored, matters proceeded for a time on an uneasy footing.

It is noteworthy that in his press contributions Espin now no longer identified his observatory with the Society. His ties with it were weakening. The Wolsingham Observatory itself was moved bodily from Wolsingham to Tow Law in the autumn of 1888 to remain on its new site for almost half a century and throughout the whole of that time its original name - Wolsingham Observatory - was applied to it, despite the fact that it functioned at Tow Law for very many years longer than it did at Wolsingham.

The years 1889 and 1890 witnessed an ever widening cleavage in the ranks of the Liverpool Astronomical Society. It is distasteful to retail the press utterances of that time which evidently were the culmination of personal animosities. Recrimination recurred. It is too wasteful an exercise to

merit any considered attention and therefore the consequences only will be described.

Already it has been mentioned twice that only a small part of the total membership of the Society actually lived in the Liverpool district and these relatively few persons were those who formed the audiences at meetings and lectures. By far the greater number dwelt afar off and the 'Journal' - until its demise - was the main link between them and the centre of the Society's activities. A proposal that a new association should be formed for these non-Liverpolitans gained currency and, as always, the correspondence and news columns of the English Mechanic contained many contributions on the matter.

By August 1890 with the active aid of Mr. E. Walter Maunder, a new society was in process of formation and on the 15th of that month he published - again in the English Mechanic - a draft programme of the proposed body (38). This draft was a model of its kind : in half a column of print it gave concise details of what was projected, including the provisional committee, and - a commendable step for Victorian times - it abolished sex discrimination in its membership.

Of course the irresistible tendency to indulge in pretentious display made its appearance. Dr. Huggins, Mr. George Calver, Mr. T.W. Backhouse, Mr. J.E. Gore, and Espin, amongst others, were named as founders. The promoters had sound sense in making the annual subscription half a guinea, but more debatable was the choice of title viz. The British Astronomical Society. In order to avoid embarrassing confusion with that more venerable body the Royal Astronomical

Society, it was agreed at the first general meeting held on 24th October 1890 to substitute the name of the British Astronomical Association, and which, over eighty years later it still retains. (39)

The development of this new association in so far as it concerned Espin will be narrated separately, but before closing the topic of the Liverpool Astronomical Society a short review of Espin's connection with it may be made. It had lasted from 1881 until 1890, beginning about the time of his graduation from Oxford and enduring through curacies at West Kirby and Wolsingham to his incumbency of Tow Law. When he left it he was thirty two years old and well established as an astronomer of note, and in discharging the various offices which he held over the years - President, Vice-President, and Special Observer - he undoubtedly contributed much to its prestige. By his vigour in its initial stages he helped to create an organisation which grew to worldwide proportions. Of his papers, publications, and circulars, some account has been rendered, and still more complete details are to be found in the dossier.

The human failings of its members finally brought disruption upon the Liverpool Astronomical Society and although efforts were made as late as January 1891 to fuse it with the newly-formed British Astronomical Association they came to nothing. This notwithstanding the Liverpool Astronomical Society did not expire. It surmounted its difficulties and still continues (1972) as 'the oldest and largest society of its kind in Britain' (40).

References :-

1 MNRAS : Feb. 1935 : 95 : p. 319.

2 EM : 5-5-1876 : XXIII : p. 198.

3 EM : 23-1-1880 : XXX : p. 480.

4 EM : 28-4-1882 : XXXV : p. 168.

5 Information relating to the early days of the Liverpool Astronomical Society has been extracted from the Minute Book by Mr. L. Birch, its present librarian.

6 EM : 26-1-1883 : XXXVI : p. 471.

7 EM : 20-4-1883 : XXXVII : p. 147.

8 EM : 18-5-1883 : XXXVII : p. 241.

9 EM : 1-6-1883 : XXXVII : p. 287.

10 EM : 29-6-1883 : XXXVII : p. 384.

11 EM : 9-5-1884 : XXXIX : pp. 209-210.

12 This information has been supplied by Mr. Birch (supra).

13 EM : 24-10-1884 : XL : p. 174.

14 EM : 9-5-1884 : XXXIX : pp. 209-210.

15 EM : 21-11-1884 : XL : pp. 258-259.

16 EM : 24-4-1885 : XLI : p. 166.

17 EM : 23-10-1885 : XLII : p. 160.

18 EM : 8-1-1886 : XLII : p. 380.

19 EM : 15-1-1886 : XLII : pp. 402-403.

20 EM : 5-2-1886 : XLII : p. 467.

21 EM : 23-7-1886 : XLIII : p. 457.

22 The designation 'Fellow' was one of great dignity in the 1880's and was reserved to certain members of colleges, some holders of stipendiary positions in Universities, those admitted to learned societies, and in a few of the younger Universities to persons on the governing body. Nowadays it extends to the highest class of membership in the chartered engineering institutions as well.

References :- (concluded)

23 EM : 12-2-1886 : XLII : p. 489.

24 EM : 30-4-1886 : XLIII : p. 189.

25 EM : 21-5-1886 : XLIII : pp. 252-253.

26 EM : 23-7-1886 : XLIII : p. 457.

27 EM : 14-1-1887 : XLIV : pp. 430-431.

28 EM : 28-1-1887 : XLIV : pp. 475-476.

29 The date of Espin's resignation from the Vice-Presidency has been confirmed by Mr. Birch, already mentioned.

30 EM : 29-7-1887 : XLV : pp. 507-508.

31 RS : p. 1.

32 The present Librarian of the Royal Irish Academy has furnished this information.

33 RS : p. 10.

34 RS : p. 193.

35 RS : p. 5.

36 EM : 19-10-1928 : IV : p. 518.

37 EM : 5-4-1889 : XLIX : p. 108.

38 EM : 15-8-1890 : LI : p. 527.

39 EM : 31-10-1890 : pp. 203-204.

40 Mr. Birch has written to this effect.

THE BRITISH ASTRONOMICAL ASSOCIATION

The preceding section ended with an account of the disunity in the Liverpool Astronomical Society which gave rise to the formation of the British Astronomical Association in 1890. As there related Mr. E. Walter Maunder of the Royal Observatory at Greenwich was a leading figure in starting the new association, and the account of its formation and progress is now taken up from the time of the first general meeting on 24th October 1890.

For this event the promoters had the use of the hall of the Society of Arts in John Street, Adelphi, London, and by reason of the arduous and extremely competent work of organisation undertaken before the meeting by Mr. Maunder, a membership of nearly 300 had already been enrolled. Moreover after paying initial expenses a cash balance of L.185 was in hand. The association began its activities under the able Presidency of Capt. W. Noble F.R.A.S. and a distinguished list of Vice-Presidents including the Earl of Rosse and Dr. William Huggins. Eight observing sections were set up, each with its own Director who was chosen for his specialised knowledge needed by one required to co-ordinate work in a particular avenue of observation.

The Director selected for the Spectroscopic and Photographic Section was the Revd. T.H.E.C. Espin, but in accepting this position Espin limited his commitment to the tendering of advice and direction to workers in the field, and to the observation of specific stars about which the Council of the Association might need information. (1) This proviso was needed because at the time he was fully engaged in his own pursuits at Tow Law.

These were comprehensive enough. Early in the Spring of 1890 the final proofs of the new edition of 'The Red Stars' of Mr. John Birmingham had been checked and the material brought to the verge of publication, a task (described elswhere) which had occupied Espin for several years. (2) Directly that work had been accomplished the search for stars with remarkable spectra began. In 1890 alone Espin discovered 70 of these objects. In the next year, 1891, he re-observed many of the stars detailed in the red star catalogue and made searches for Type III and Type IV stars on the Secchi classification - an effort which resulted in his finding 120 stars of Type III and, oddly enough, only 1 of Type IV. (3)

In this interim (1890-1891) he also contributed two articles to the Journal of the Association. The first was entitled 'Three New Red Stars' (4) and the second 'Two New Red Stars and a possibly Variable Star' (5). It is, in consequence, understandable, to quote the Journal of the Association ....'Under these circumstances no report has been made from this Section' .....

For the second session of the Association extending from October 1891 to October 1892 the Observing Sections were increased from eight to eleven. Espin's own Section was divided. He continued to act as Director of a new Stellar Spectroscopy Section, whilst the Revd. Fr. W. Sidgreaves of the Stonyhurst College Observatory became Director of a Solar Spectroscopy Section. Once again no report appeared for Espin's Section at the end of the session and the impression develops that his interest in the British Astronomical Association was waning. Nonetheless he did contribute a single article

to its Journal on 'Spectroscopic Observations and Light Curve of Nova Aurigae' (6) and he gave his own account of this work at a meeting of the Association held in Barnard's Inn Hall, Holborn, London, on 24th February 1892. (7)

The third session embracing the period October 1892 to October 1893 saw changes in the hierarchy of the Association. Espin was not even mentioned as an officer, and Fr. Sidgreaves became Director of what was called the Spectroscopy Section. It seems, therefore, that Espin was quietly dropped from the higher ranks and became merely a member. His only contributions to affairs were two articles in the Journal. The first of these was 'Micrometrical Measurements of Double Stars in connexion with the New Edition of 'Celestial Objects' ' (8), and the second 'An Anonymous Star in Perseus and certain Variable Stars of the Fourth Type' (9) .

As related already Espin had, of course, been a founder member and President of the Liverpool Astronomical Society and after the unfortunate events which occurred in the life of that Society had been amongst the first to assist in the formation of the British Astronomical Association. It is curious that his interest in thelatter should have declined so rapidly during its early years : yet such was the case. If a reason is to be assigned it could be one of remoteness from the centre of activity. When Espin was identified with the Liverpool Society he lived, for most of the time, nearby at West Kirby on the Wirral Peninsula and used its observatory until 1885 when he moved to County Durham, but even then he carried on observational work for it until 1887 : in sum his interest was personal and lively during the whole time of his membership.

By comparison the British Astronomical Association was a London-based body holding its meetings there and communicating with Espin by means of its 'Journal'. Tow Law lies about 250 miles to the north of London and he would hardly feel as much at ease as he did with the locally resident people of the Liverpool area with whom he lived for so long. Indeed the affinity on Merseyside was such that one colleague of Espin's - W.H. St. Quintin Gage - followed him to Wolsingham and the pair lived close together during Espin's curacy of the parish.

But whatever the true reason may have been Espin certainly followed a divergent path, a course hastened possibly by a none too kind review of his fifth edition of Webb's 'Celestial Objects for Common Telescopes' which appeared in the Journal of the British Astronomical Association in 1893. (10) The reviewer, who was tantalisingly anonymous said outright ..... ' we are disappointed with Mr. Espin's work' ..... and ..... 'Mr. Espin has had a grand opportunity, and has let it slip' ..... . However true or false these statements might have been they were the last of any note to appear in the 'Journal' in respect of Espin for the next two years.

In making and publishing such adverse criticisms their unknown author brings his own bona fides into question. Without doubt he was fully entitled to utter fair comment, but equally so the person assailed had a right to know the identity of his attacker, which in this case was denied to Espin. The reviewer, therefore, even allowing his judgment to be sound, did not observe an acceptable standard of conduct by thus having recourse to self concealment.

Late in 1895 Espin was listed amongst the members of the Observing Sections of the Association as one concerned with variable stars, and finally, on 23rd February 1898, Espin attended a meeting of the Association and gave an account of an object which he had found in Perseus (11) . This address was followed by a note on the matter by Mr. Isaac Roberts (whose name it may be remembered was prominent in the Liverpool discord) and with it the connexion of Espin with the Association ended. (12)

The attachment of Espin to the British Astronomical Association had been a short one - from 1890 to 1898 to be exact - but for the last three years of that period he had contributed little to its activities. His X-ray work began in 1896 and the competing claims of this avocation could have drawn away such of his failing interest as lingered. It was greatly to the credit of the Association that it published an obituary of Espin in January 1935 (13) . This omitted any reference to his former membership but otherwise sketched his career with reasonable brevity and accuracy.

(References follow on the next page)

References :-

1 JBAA : 1890-1891 : I : pp. 545-546.

2 WOR : 1890.

3 WOR : 1891.

4 JBAA : 1890-1891 : I : p. 130.

5 JBAA : 1890-1891 : I : p. 316.

6 JBAA : 1891-1892 : II : pp. 328-332.

7 EM : 4-3-1892 : LV : p. 32.

8 JBAA : 1892-1893 : III : pp. 226-230.

9 JBAA : 1892-1893 : III : pp. 431-432.

10 JBAA : 1893-1894 : IV : p. 75.

11 JBAA : 1897-1898 : VIII : pp. 216-217.

12 JBAA : 1897-1898 : VIII : pp. 279-280.

13 JBAA : Jan. 1935 : 45 : p. 128.

THE NEWCASTLE-UPON-TYNE ASTRONOMICAL SOCIETY

After his former experiences with the Liverpool Astronomical Society and therefrom the British Astronomical Association it would be an expected consequence that Espin's venture into yet another organisation of a like nature would be tempered with prudence. Indeed it was. He entered the Newcastle association only on written invitation and an unanimous acceptance by its members, which came about in this way.

During Michaelmas term of 1903 the Revd. T.E.R. Phillips M.A., F.R.A.S. delivered a course of lectures on astronomy in connection with a Durham University Extension Course. These lectures were given in the rooms of the Literary and Philosophical Society at Newcastle-on-Tyne in which city a division of Durham University was then established. They must have met with success for at a meeting of students held on 22nd January 1904 it was decided unanimously to form an astronomical society and a provisional committee was appointed forthwith. Mr. Richard Welford J.P., F.R.A.S. was invited by letter to become President.

A week later - on 29th January 1904 - at the next meeting a letter from Mr. Welford was read in which he declined this offer - whereupon letters were sent to five other local astronomers asking them to fill the positions of President and Vice-President. They were : Mr. T.W. Backhouse of Sunderland, Mr. A.T. Flagg of South Shields, the Revd. T.H.E.C. Espin of Tow Law, Prof. R.A. Sampson of Durham University, and Mr. Edward Sparkes of Sunderland.

On 5th February 1904 at the third meeting replies had

come to hand from all five persons but there is no record as to what these were. However at the same meeting Rules were adopted and a list of officers was approved. This list named the Revd. T.H.E.C. Espin M.A., F.R.A.S. as President with the Revd. T.E.R. Phillips M.A., F.R.A.S., Richard Welford J.P., F.R.A.S., and Mr. Lawrence Richardson, as Vice-Presidents. The Society had, in fact, established itself, and it has continued without a break up to the present time (1972).

Espin held this Presidential office for the rest of his life. He was not an ornamental figurehead but contributed regularly to the life of the Society by gifts, by lectures, and by invitation to his observatory at Tow Law. In his day there was a direct railway line from Newcastle via Shotley Bridge and Burnhill to Tow Law which facilitated travel even from his remote parish to the meetings centred on Newcastle. His visits were restricted in winter, when, as often occurred, the snowploughs were unable to clear the line for traffic, or when his observational programme would not suffer interruption.

It may be remarked that this new society from its inception followed a course by which the mishaps at Liverpool in 1886 were avoided. It did not publish Proceedings : it had no affiliated branches : it lived within its modest means : it was also very successful.

The Minute Books of the Society enable an appreciation to be gained of the astronomers of the area and their mutual collaboration. Within a fortnight of its formation Espin presented the Society with a star atlas and some books, and on 11th March 1904 he delivered its first public lecture which was chaired by Lord Armstrong. His title, appropriately, was

'The Work of an Amateur Observatory' illustrated by lantern slides. Most of the local astronomers were members and many contributed papers, Mr. Lawrence Richardson, and Mr. T.W. Backhouse, being examples. Both Richardson and Espin fostered the interest of members in astronomy by inviting visitors to their own private observatories, and on one particular Saturday afternoon, that of 27th October 1906, a party of fourteen members went to Tow Law by rail to inspect Espin's equipment. This visit is of note for it is recorded that after examining the observatory and having 'an excellent tea' Mr Espin .....' showed us his electrical apparatus, a powerful machine largely made by himself, and fitted with many of his own improvements. He uses it for the application of the Roentgen Rays and for the cure of certain diseases, as well as for other more purely scientific experimental purposes. A very interesting demonstration of its capabilities was given including the production of the X-rays'.....

The curative treatment which Espin carried out by use of X-rays is dealt with elswhere : here it may be noted that he was active in that sphere during 1906, some ten years after he first began his investigations in 1896.

The status of the Newcastle Astronomical Society was sustained by quite a number of eminent lecturers. Prof. R.A. Sampson contributed a forecast of the phenomena expected at the total eclipse of the Sun of 30th August 1905. He was then Professor of Mathematics at Durham University. On Saturday 2nd November 1907 he conducted a party of eleven members over the Durham University Observatory and a description of the almucantur is given in these words .....' Prof. Sampson first showed us and

described in detail the almucantur which is kept in a separate building. It is a telescope which is floating in a bath of mercury and is the only instrument of its kind in use ' .....

Professor H.F. Newall M.A., F.R.S. of Cambridge gave an address on 'Multiple Stars discovered Spectroscopically' at a meeting in 1911 chaired by Espin. Newall's father it may be said lived for many years at Gateshead where the well-known 25-inch Cooke refractor was first erected. In the same year Espin described his own discovery - Nova Lacertae on 30th December 1910 - at a conversazione of the Society. The account of this discourse, made at the time, is well worthy of scrutiny and a photocopy has been included accordingly in the dossier. (1)

The most outstanding event during the Presidency of Espin took place in 1930. On 17th January of that year in the King's Hall of Armstrong College at Newcastle-on-Tyne with Sir Charles A. Parsons in the chair, Sir Frank Watson Dyson, the Astronomer-Royal, gave a public ledture for the Society on the work of the Royal Observatory at Greenwich. Espin, naturally, was present, and a photograph of all three men taken at the time is similarly included. The Astronomer-Royal and Espin were very good friends and the former visited the Wolsingham Observatory next day as his signature in the Visitors Book there clearly shows.

At the funeral of Espin on 6th December 1934 the Society was represented by three of its most prominent members viz. Mr. Lawrence Richardson, Mr. H.W. Davis, and Mr. Frank Sargent.

References :-

1 MNAS : 13-1-1911.

The greater part of the data contained in this section have been abstracted from the Minute Books of the Newcastle Astronomical Society by courtesy of its present secretary, Mr. George Manville.

CHAPTER V

HIS PARISH - THE TOPOGRAPHY AND LIFE OF TOW LAW

Whatever the attributes of a man may be his mode of living, his activities, and to a great extent his conduct, are all affected by his surroundings. The way in which those qualities of mind and body implanted by Nature find their expression is regulated by environment and for this reason it is material to the biography of Espin that an account of the history, topography, and general outlook of the parish of Tow Law should be given.

An outline is to be sketched of the several factors which transformed a lonely moorland, desolate from Saxon times until the mid-1840's, into a thriving industrial area within a decade, which then prospered for a brief space before declining to a remnant within the next forty years. It was purely by a twist of Fate that the founder of Tow Law - Charles Attwood - became connected with the locality : it may, equally well, have been Robert Stephenson, better known to-day as a famous railway engineer. To this and other relevant matters attention is now directed.

The place-name Tow Law is believed to be derived from the Old English tōt-hlaw signifying a look-out hill. The Domesday Book of William the Conqueror compiled in 1085 did not include the lands of the Bishopric of Durham, but in 1183 when Hugh de Puiset was bishop of the diocese he caused his own survey to be made and this is known as the Boldon Buke. In it there is no reference at all to Tow Law. During the XIV century

Bishop Hatfield's survey also omits any reference, but in the ecclesiastical records of the following century mention is made of Tollawe in 1423. In 1765 Commissioners divided the land of the East Township of Wolsingham and the name of the area was then stated as Tow Law. The locality which now (1972) forms the township of Tow Law was very largely purchased by the Weardale Iron and Coal Company's promoters in 1845 or thereabouts.

The original name of 'look-out hill' was amply justified for the district has an average elevation above sea level of over a thousand feet and it commands a view of the surrounding fells for miles around. About 1841 there was one solitary farmhouse bearing the name Tow Law and this still stands in a hollow close to Attwood Place and retains the name of Tow Law House. (1) Before industry arrived the locality was wild moorland with little arable land and was mainly given over to the rearing of cattle and sheep. To the west and north of the township wild life in the form of grouse, moorcock, partridge, pheasant, and occasionally wild deer, may still be stalked.

Furnaces for the production of iron were used in the County of Durham in the XV century. Bishop Langley had furnaces and a forge at Bedburn, five miles south of Tow Law, in 1408-1409 of which records are preserved, and a foundry was still in use at that place early in the XIX century. (2) In the XVII century the Prince Bishops - for Durham was a County Palatine - possessed the manor of Weardale and Iron was smelted there. Steel too, was produced. The manor was of considerable extent stretching from Witton-le-Wear in the east to Alston Moor in the west, and it included what is now Tow Law.

Later the right to abstract ore was acquired by the Weardale Iron and Coal Company in which one, Charles Attwood, was an original member. During its long existence (1846-1956) this company had changes in title but here it will be always referred to in the style given for such is aptly descriptive of its main pursuits viz. iron and coal. (3)

When Espin arrived at Tow Law in 1888 he came to a depressed parish which in the recent past had enjoyed far better days. The staple source of livelihood - the ironworks - had virtually ceased to function, and during his incumbency the locality lost over twenty per cent of its inhabitants for lack of employment. During his later years the rigours of the war from 1914 to 1918 and the paralysis of a prolonged coal strike in 1926, made it a stricken area. Even to-day (1972) the population is only one half of what it was in 1881.

Despite the condemnation which the exercise of wisdom after an event can arouse, it is evident that the unhappy state of affairs at Tow Law in late Victorian times need not have occurred as it did. Presently it will be told how the Weardale Iron and Coal Company rose and fell, but to paraphrase for a moment it may be said that what Goliath could not do a David accomplished. In 1886 and at a time when the activities of the Weardale company at Tow Law were dwindling rapidly, Mr. Joseph Bond had the enterprise to establish his Castle Foundry and Patent Steel Works, and indeed Bond's Foundry Company still continues at Tow Law. So too does the steel works of George Blair and Co. Ltd. just to the north of Tow Law. Both are far less pretentious than the undertaking of the Weardale company but

they have continued to give work in the locality and to produce manufactured products, for generations.

It is now necessary to revert to Charles Attwood in the early 1840's. He was vigorous in promoting the development of the natural resources of the district and such began at the much older parish of Stanhope some eight miles due west of Tow Law. Attwood arrived at Stanhope from the Cleveland area in the North Riding of Yorkshire where, in 1841-1842, he had been examining the region in the hope of discovering ironstone deposits and would have so continued had not a Mr. Walton brought to him a sample of Weardale 'vein' ironstone. This chance meeting occurring when it did, brought Attwood to Stanhope on 23rd July 1842. (4)

During this same year (1842) two courageous men named Rippon and Willis began to construct a furnace at Stanhope which they found themselves unable to complete. In 1844 this unfinished structure was purchased by Charles Attwood, Thomas Baring, and Joshua Bates, in partnership, and was later taken over by the Weardale Iron and Coal Company upon its formation in 1846. All the remaining work was completed and the furnace put into blast in 1845. This furnace was intended to be supplied solely with the iron of the carboniferous limestones of Upper Weardale. (5)

Now Stanhope, although conveniently close to the ironstone of Weardale, was beyond the bounds of the Durham coalfield, whilst Tow Law lay at the western edge of the coal measures where they merge into the mountain limestone containing the needed iron ore, and so is located rather more conveniently

for the construction of ironworks. This led Charles Attwood and his associates to build five furnaces at Tow Law in 1845 and these used other ores for mixing in addition to those from Weardale itself. (6) A short note on the mineral resources of the area is included in the dossier. The purchase of the Stanhope furnace and the later expansion at Tow Law was financed by the merchant banking house of Baring Brothers, in the City of London, of which Thomas Baring and Joshua Bates, already mentioned, were respectively senior partner and next senior partner.
It is of passing interest to say that a Baring Street was shown on the first Ordnance Survey made of Tow Law in 1857-1858. The street stood through the years until 1968 when it was demolished and upon its site homes for aged people are intended to be built.

One purpose of the industrial venture at Tow Law was to manufacture steel rails and chairs for the railways which were being constructed at that time, and particularly for those projected in the U.S.A. Thomas Baring visited North America in 1852 and commended the products of the Weardale Iron and Coal Company to an ironmaster in New England, but with so much promise and so sound a finance house to fortify him, it is sad to say that Charles Attwood fell far short of what was expected of him in the management of affairs at Tow Law. The enterprise there did not prosper as had been anticipated and Joshua Bates made a gloomy report upon it in 1859.

About this time (1859) Attwood hoped to revive the failing fortunes of the Weardale company by starting a new steelmaking process, and Baring's agreed - with diffidence - that this should be given a trial for a year. Now at this late date it cannot be ascertained exactly what that process was, but

it is relevant to state that Henry Bessemer (later knighted) made known his process for the decarbonisation of molten pig iron by means of an air blast, to a meeting of the British Association for the Advancement of Science at Cheltenham in 1856. Initially it was applied to the production of malleable iron, and then to steel making with the aid of Robert Mushet's improvement. The Bessemer process was made available to industry by licence and it seems that Attwood adopted a technique which to say the least was closely similar. In doing this he committed his greatest folly for in 1861 the Dowlais Company, then owners of the Bessemer patent, took legal action against the Weardale Iron and Coal Company for infringement.

The consequence was that an agreement was reached with the Dowlais Company in August 1861 for the payment to them of compensation, but nothing was forthcoming and the dispute still continued three years later. As to how it ended no record remains, but in April 1864 the negotiations had reached a stage where compensation of L.2,500 was suggested with the right of the Dowlais Company to purchase any Bessemer equipment at Tow Law.

It is readily understandable that settlement could not be made by Charles Attwood and his colleagues for by 1862 the deficit of the Weardale Iron and Coal Company had reached L.422,000 (1972 equivalent value = L.2,300,000) and Baring's became insistent that Attwood should go either of his own free will or by discharge.

This brief outline of the dismal financial background of industry at Tow Law is enough to show why it was that the ironworks enterprise withered and virtually died in the

succeeding years. Charles Attwood was in many ways a remarkable man and a generous one, but to make a commercial success of the Tow Law undertaking was clearly beyond him.

The foregoing is a sketch of the actual course of events but an alternative might well have come about in this manner :- In 1832 there was founded 'The Stanhope and Tyne Railroad Company' with Robert Stephenson as its consulting engineer (7). It was brought to premature bankruptcy in 1840 largely by the exorbitant wayleave charges which it was forced to pay to the Church which owned land over which the line passed. The company was obliged to close the Stanhope end of the railway and to give up its use of the limekilns there. On 5th February 1841 it was dissolved and a new company called 'The Pontop and South Shields Railway Company' took most of the property of the earlier enterprise and appointed Robert Stephenson its chairman. In the realisation of assets of the Stanhope and Tyne Railroad Company its interests in the Derwent Colliery were disposed of by Deed of Assignment and the Stanhope section of the permanent way, with the Stanhope quarries, were sold to the Derwent Iron Company of Consett, about ten miles due north of Tow Law. (8)

Even after these unfortunate events Robert Stephenson had confidence in the potentialities of Weardale iron as late as 1843-1844, but he was too circumscribed by existing commitments to venture into new ones. Had he been freer his position as an eminent engineer must surely have influenced favourably any industrialists, and bankers, interested in mineral exploitation. The strangleholds of wayleaves and debts killed the Stanhope line and caused the division of the company. Therewith went

the Derwent coal supplies and the limestone quarries. The door was open for another to enter and being conveniently at hand Charles Attwood did so.

The demise of the ironworks of the Weardale company at Tow Law which occurred about 1892 did not carry with it their mining interests. Black Prince Colliery, near Dan's Castle continued until 1914 and West Thornley Colliery until 1928. At the peak of prosperity at Tow Law Black Prince employed over six hundred men working four coal seams, and with over a thousand men also working at the furnaces and ironworks, the total labour force must have been close to seventeen hundred persons. It is a fleeting memory of past glories to recall that during the Crimean War of 1853–1856 cannon balls used in that conflict were made from Tow Law iron, and a locality near the pit took on the name of Inkerman which, it may be inferred, bore allusion to the repulse of the Russian attack on that place on 5th November 1854 during the course of the war.

Of the colliery and the ironworks little now remains, and there will be even less in the future for the slag heap from the furnaces has become the site of a refuse tip for the Tow Law community. There are, however, two buildings which commemorate Charles Attwood and a charity which bears his name. At the lower end of Ironworks Road, at Attwood Place, the former headquarters of the company still stand, well-kept, and typically Victorian in their solidity and spaciousness. Originally the building was in three parts : the middle section comprised the offices, the east end the abode of the Secretary/Treasurer, and the west end the home of the Manager. To-day these are

private dwellings. Towards the crest of the same road the Company erected a Mechanic's Institute in 1857 which then had a reading room, a library, and a regular supply of current magazines. Now it houses the Tow Law Community and Youth Centre.

The Attwood Charity deserves mention. Charles Attwood made his Will on 12th February 1875 and in it he directed trustees - inter alia - to pay the sum of L.25 per annum to the incumbent of Tow Law parish which should 'be applied for the benefit of poor people in physical need without distinction of religious sect'. After Attwood's decease an Order of the Chancery Division of the High Court of Justice of 15th March 1886 directed that a sum of L.168. 0. 8d. arrears of income of the charity should be paid to the incumbent and this money was then invested in Government Stock in the names of the Official Trustees of Charitable Funds. The annual sum available was, therefore, increased by the interest accruing from this investment.

Espin distributed this charity by way of tickets for food and clothing which could be presented to local tradesmen, from whom they were later redeemed in cash by the vicar. Altogether Attwood established ten charitable annuities, one of which was that relating to Tow Law. A generous man indeed. (9)

The influence of industry and of its chief architect Charles Attwood being sufficiently described in the preceding paragraphs, regard will now be paid to the social conditions which prevailed.

The rapid growth in population from 1846 when prosperity, such as it was, rose steadily, was accompanied by the customary

became established. In those days the denominations were separated by wider and deeper cleavages than is the case to-day. Respectability and churchgoing were linked and whilst all sects aspired to a common goal they were discrete and their relationships with each other detached.

First there was the Wesleyan Methodist Chapel dating from 1842, and which was enlarged in 1881. The Primitive Methodist Chapel was built in 1846 and extended in 1868, and the English Presbyterians constructed their church and manse in Bridge Street in 1865. The Roman Catholic Church at the top of Castle Bank first had a combined school and chapel which, in 1875, was made into a Church. (10) Adjacent to it the convent of S. Joseph of the Sisters of Mercy was founded in 1870. A Gospel Mission appeared also but details of it are lacking.

The Anglican church of S. Philip and S. James had as its first incumbent the Revd. Michael Henry Simpson B.A. (Cantab) when the ecclesiastical parish was formed in 1878. He died on 15th June 1888 and was succeeded by the Revd. T.H.E.C. Espin later in the year.

All the above pursued their separate ways. But there came along one body of Christians which stood in isolation from this general rule. The exception was the Salvation Army whose thrusting and emotional appeal cut through all creeds and threw to the winds the conventional niceties of orthodox religion. In thepublic houses, and there were about a score all told, and in the streets it functioned as effectively as in its own citadel and freely acknowledged the merits of other beliefs and the

shortcomings of its own. In almost every way it made an approach to the populace in a manner which the patrician nature of Espin never could have done. He, indeed, always preserved the dignity of his church and faith, a nd whilst he did so and the other sects held to their tenets, the Salvation Army grew strong and so remained for many years.

Three schools appeared. The Roman Catholic school has been mentioned already : it was staffed by nuns of the convent. In addition a National School was built as early as 1849 on a site provided by the Weardale Iron and Coal Company. The Wesleyan School was founded in 1859 in Wesley Street, later renamed Station Street, and two ladies - the Misses Catherine and Annie Appleby - conducted a school for young ladies at Dan's Castle in 1894, so affording the social distinction of private education

Local government began by the formation of a Local Board in 1864 which dealt with sanitation (of sorts), roadmaking, street lighting, and nuisance abatement, to mention its main functions. It took over the gasworks at Tow Law in 1887. Water supply was piped to the district by the Weardale and Consett Water Company.

Other accompaniments of community life came in a steady flow and may be summed up briefly. In 1894 Tow Law had 18 inns and hotels together with 4 beerhouses and off-licences, 2 banks, 2 doctors, a solicitor, and a chemist. There was a Post Office, a co-operative stores, a railway station, and a flourishing cattle market established in 1882. The police station was some little distance from the township at Helme Park road ends.

The social life of the area must have been affected

markedly by the liberal - even excessive - provision of intoxicants. It was far more than was needed and the inference of drunkenness amongst its predominantly working class population seems unavoidable. This point can be exemplified by data. According to the Census of 1891 the populace of Tow Law was 4,554. In the previous paragraph it was stated that at this time 22 premises sold intoxicants, so that there was one such place for every 207 inhabitants. A veritable paradise for a brewer.

One need hardly dilate on the poverty and misery which a drunken parent, a large family, and a small dwelling, combined to produce in an era before State benefits existed. The pastoral problems which this brought about could test the fortitude of any religious leader and they may well have confronted Espin with a formidable task. There was none of this at Oxford, West Kirby, or Wolsingham. Mundane attractions, indeed, far outnumbered spiritual ones.

By comparison it may be noted that in 1972 Tow Law had 9 public houses, 1 licensed club, 2 off-licences, and a licensed restaurant, to serve a population estimated by the Registrar-General at mid-year of 2,550. This is equivalent to one source per 196 inhabitants, which is on a par with the ratio of eighty years earlier, and still well above the average for the region. In another part of Durham County, in 1972, a typical ratio of one premises for each 750 head of population occurs. The present day relative sobriety of Tow Law is therefore commendable.

The community which sprang up at Tow Law was grouped

in several ways for religious and secular purposes, and distinction needs to be made between the ecclesiastical parish, the civil parish, the sanitary district, and the urban district, all of which may be correctly prefixed 'Tow Law' . These are referred to by their individual titles in the available sources of information so for clarity they will be described briefly and given their proper abbreviations. Confusion otherwise might easily occur, and so mislead, when consulting references.

The ecclesiastical parish (E.P.) of Tow Law emerged by succesive division from the mother parish of Wolsingham. On 22nd February 1848 Wolsingham E.P. was reduced in extent by the removal from it of Thornley E.P. and there existed thenceforward a Rector of Wolsingham and a Vicar of Thornley. Such continued until 2nd April 1878 when Tow Law E.P. was carved from Thornley, and the title of Perpetual Curate was assigned to the incumbent of Tow Law. The mother parish of Wolsingham prior to 1848 was under the patronage of the Bishop of Chester and as may be expected this right of presentation continued from 1848 for Thornley E.P. and after 1878 for Tow Law E.P. in addition to the uninterrupted control of appointment of the incumbent of Wolsingham E.P.

Designations of beneficed clergy in the Church of England in the early days of Espin had a relevance to their religious dignities which is not nearly so apparent nowadays. A Rector had the highest status, a Vicar somewhat less, and a Perpetual Curate least. The last-named was a cleric appointed normally to a parish excised from an older and larger one, and

for this basic reason his rank was held to be inferior to that of the incumbent of the mother parish, although the practice was not universal as may be instanced already in the case of the Vicar of Thornley.

Perhaps it should be stated that Thornley E.P. was re-united with Wolsingham E.P. on 1st April 1964 and the two then became a united benefice (U.B.). The Revd. Norman Richardson the present Rector of Wolsingham is now also Priest-in-Charge of the Church of S. Bartholomew at Thornley.

At the Census of 1901 Tow Law E.P. had 747 inhabited houses and a population of 3,702. The corresponding figures at the 1911 Census were 787 and 3,646, respectively. These numbers differ markedly from the analogous data for Tow Law Urban District (U.D.) as a comparison with the following table will show.

Tow Law Civil Parish (C.P.) came into being as a result of the Local Government Act of 1894 and the subsequent County Council Naming Order. It was created out of part of Wolsingham C.P. Before this Act was passed the township was known, for civil purposes, as Tow Law Urban Sanitary District (U.S.D.). Afterwards it had the title of Tow Law Urban District comprising two civil parishes viz. South Cornsay C.P. and Tow Law C.P. from each of which councillors were elected to serve on the Tow Law Urban District Council.

In the six consecutive Censuses held during the vicariate of Espin the data set out in the table on the next page were recorded.

Title of district	Census year	Area in acres	Inhabited houses	Population
Tow Law U.S.D	1881	468	914	5,005
do.	1891	470	904	4,554
Tow Law U.D.	1901	477	890	4,371
do.	1911	477	932	4,324
do.	1921	477	911	4,071
do.	1931	477	912	3,559

Two further terms are to be distinguished i.e. the Parochial Church Council (P.C.C.) and the Parish Council (P.C.). The former is applied invariably to a church organisation and the latter to a secular body. Since parish councils only exist in rural districts, and Tow Law is urban, it has no parish council.

Espin's clerical jurisdiction, strictly, extended only over the area of Tow Law E.P. but it is frequently the case that people become attached to a church outside their own parish and it is most probable that his congregation would come from the whole of the urban district and even from beyond its boundaries. The figures in the preceding table show that the population was a declining one in a compact area.

With a curate to assist him in pastoral work and a layman in the person of Mr. William Milburn to help in astronomical observations from 1912, Espin was well-placed to follow his bent in scientific matters generally. His household staff of a resident housekeeper, a maid, and a part-time gardener, made life comfortable if not elegant, and in marked contrast with the standard of existence in the dwellings of his parishioners. In these easy circumstances many a man

would have tended towards laxity, and it speaks well for his naturally alert and active disposition that he persevered in intellectual activities right up to the time of his death.

References :-

1 W : p. 420.

2 P : p. 279.

3 R : p. 26.

4 TNIME : pp. 174-175.

5 TNIME : p. 168.

6 TNIME : p. 169.

7 T : p. 214.

8 T : pp. 442-444.

9 Particulars of the Attwood Charity for the parish of Tow Law have been obtained from 'Endowed Charities - Parish of Wolsingham' by courtesy of Mr. G.L. Lister, of Waskerley House, Wolsingham.

10 W : pp. 420-421.

Data relating to Baring Brothers, merchant bankers, have been supplied by Mr. T.L. Ingram, the archivist of that company.

CHAPTER VI

PERSONAL CHARACTERISTICS

The position occupied by the Vicar of Tow Law was a commanding one. Being a man of professional standing with private means, a magistrate, and an astronomer of repute, to mention a few of his attributes, he was held in high respect and it was the practice always to address him as 'Sir' . One may imagine, therefore, the shock which one of the young boys of his congregation sustained when a visiting lady – Miss Siddons – actually presumed to call him 'Tom' in the course of conversation. That boy is now (1972) an elderly gentleman, Mr. Roland Heslop, but he vividly remembers this incident of over sixty years ago.

Filial duty was strong and great affinity existed between the Espins, father and son. Once a week the son walked briskly from his vicarage at Tow Law along Ironworks Road and down Redgate Bank to visit his father at Wolsingham Rectory during the whole time his parents lived there. He then as quickly walked back, a total distance of about eight miles.

In the vicarage the invariable daily routine was that he took breakfast and afternoon tea in his upstairs 'den' (a corner room) whilst lunch and dinner were always eaten in the downstairs dining room. His scientific work such as the making of a giant Wimshurst machine was done in the den. An extensive library was situated in the ground floor room furnished with a large bay window, and his family relics, largely received

upon the decease of his father on 5th December 1912, were accommodated in an attic.

It was mentioned in the previous chapter that the vicarage was staffed by a resident housekeeper, a maid, and a part-time gardener, who were evidently skilled for quite a reputation was built up amongst the clergy of the Stanhope Deanery for the high quality of their domestic work. One long-serving housekeeper was Mrs. Henrietta Watson, and a former maid, Mrs. Fell, still survives, although her husband who helped Espin in his X-ray work died in 1961. In a letter to The Times in March 1934 some few months before Espin's death, Canon Arthur Dolphin, Rector of Edmundbyers, publicly expressed his wonder at the extent and quality of the food provided for visiting clergy, and indeed of the overall virtues of the incumbent himself.

The vicar was an inveterate smoker of both pipe and cigars, but of cigarettes never. Pipe tobacco by the pound and cigars, which were always Panatellas, by the hundred were obtained direct from London suppliers, and as might be expected in a man of his nature he had his peculiarities. He never smoked before breakfast nor within one hour after eating a meal - timed often to the exact minute - when first a cigar and later a pipe would be smoked. One practice was that he did not reamer the bowl of his pipe : he let it carbonise until it virtually ceased to 'draw' , when it would be replaced by a new one.

Espin was very much a law unto himself in his parish. No women were ever permitted in his church choir, and he stubbornly

refused even against the entreaties of his bishop, to have a Parochial Church Council. There does not appear to be any decided case in the ecclesiastical courts of England as to whether or not Espin was justified in this action, but prima facie it does seem that it would have been well within the power of his diocesan to have had Espin disciplined. In the event Dr. Hensley Henson who occupied the See of Durham from 1920 to 1939 proved to be forbearing, and in consequence, and with much native charm, Espin sent to his bishop the peace-offering of a pineapple every Christmastide.

Why he should have chosen this exotic fruit is most curious : it would have been much more appropriate had he selected an olive branch, or, by extension, even the olives which grew upon it, but he did not. Dr. H.C. Ferens who was Legal Secretary to the bishop is quite certain on the point and since he knew both Espin and Henson intimately the facts can be taken as authentic.

Overall the attitude of the bishop towards Espin was one of benign tolerance. He went so far as to refer to the vicar in one of his books (1) when narrating a conversation with Dr. Waterfield, the astronomer son of the Dean of Hereford, as 'that queer star-gazer, Espin, Vicar of Tow Law' . It requires to be added that Dr. Henson followed this statement with a candid admission of his own ignorance of scientific matters, so it appears that having on his hands what he considered to be an eccentric, he exercised Christian charity and interpreted canonical obedience very flexibly.

There is an artistic rood screen in the church at

Tow Law which, being an example of Espin's artistic bent, deserves mention. When the church was built the chancel had no partition to mark its separation from the body of the building occupied by the congregation, and Espin remedied the omission in an unusual way. First he enlisted the aid of Mr. Robert Rawes his churchwarden at the time who had a timber merchant's business in Ironworks Road, to construct a wooden frame with a centre pointed archway. This was dimensioned so as to occupy the exact width of the chancel. Next he allotted to his choirboys the task of collecting the best specimens of acorns, fir cones, chestnuts, and the like which they could find, and finally with the assistance of several helpers of whom Mr. J. Harrison, Mr. Charles Roberts, and Mr. William Work (appropriately named) come to mind, these natural fruits were glued to the framework in a patterned arrangement and the whole was stained a dark oaken colour. The finished screen is remarkable, and believed to be unique.

It took over a twelvemonth in the making and was finished by Epiphany 1892 and still stands to bear witness to the skill and devotion with which these commonplace country items were utilized in order to enhance the church interior.

Two of the major clerical parties in the Church of England in the latter half of the XIX century and the early years of the XX , were the Anglo-Catholics and the Evangelicals. Espin subscribed to neither but followed a middle course, with, if anything, a propensity towards High Church practices. Thus his Sunday services followed an orthodox pattern of Matins and Evensong and he lit candles on the altar.

Now on the super-altar stood two brass candlesticks, one on either side of a central brass cross. They were presented to the church in remembrance of the marriage in 1906 of Mr. Harry Rogerson and Miss Florence Blenkiron and they are interesting in that Espin as a Gentile so readily accepted them. Each candlestick may be described as a modified menorah, but in the true Jewish form of this religious candelabrum such from ancient times has always been that of three semicircular arms of increasing radius with a central column so as to provide seven candlesticks in a horizontal row, whereas the Anglicised version at Tow Law consisted of seven candlesticks evenly spaced along an inclined brass arm.

Espin, too, made personal gifts to his church by way of wands for the two churchwardens, the brass altar cross already mentioned, and a processional cross. A paten used at communion is also believed to be another of his donations.

He chose - with great care - vestments appropriate to the Office. For Matins and Evensong they comprised cassock, stole, and tippet, the last-named being made in the colours of an Oxford M.A. hood (red and black) and was used in substitution for it. For Eucharist he wore an alb, chasuble, maniple, and amice. He never went so far as to introduce Reservation of the Sacrament, but Eucharist was usually choral. As may be visualized the Low Church practice of evening communion never took place in his church.

Politically Espin was well to the Right : his upbringing and family circumstances supply the reasons for that choice of attitude. Whilst he did not voice his beliefs nor become a

member of the Conservative Party it was very well known that he firmly supported the union of Church and State, and by his conduct both on and off the Bench, typified law and order.

When the Revd. T.H.E.C. Espin left Wolsingham in 1888 to take up his appointment at Tow Law for some reason unexplained he took with him an old font from Wolsingham Parish church which had been replaced by a new one. This font was in three sections : the base, the shaft, and the bowl, and it has been found that it was fashioned from Frosterley marble by one, Lambert, a stonemason in the employ of Bishop Hugh de Puiset (1153-1195). (2) It is a matter of surmise as to whether Espin knew of this at the time, the probability being that he did not. However the Revd. George Pearson Wilkinson, M.A., Vicar of the adjacent parish of Thornley until 1891, who was strictly a parishioner of Espin's since Thornley Vicarage stood in Tow Law parish, came across the base one day when in the grounds of Tow Law Vicarage. Later he found the shaft and bowl in the old National School. Thereupon he obtained permission from Espin to take all three pieces to Thornley, where they were re-united and stand, adjacent to the lectern, as the font of the church of S. Bartholomew to this day.

In the sphere of music the vicar was accomplished : as previously stated he had in his early youth been a pupil of Sir Walter Parratt, Organist of the Chapel Royal at Windsor and Master of the Queen's Musick. With both piano and organ he could extemporise easily. He composed at least one hymn tune of which the original MS has been traced and a photocopy thereof appears in the dossier. It is a setting of the familiar

Nativity hymn of Edward Hamilton Sears usually known by its first line as 'It came upon the midnight clear'. There were probably others which have not been found.

Espin arranged music for the singing of the Nicene Creed and the Responses in the Communion Service which remained in use at the parish church for years after his death. During the earlier part of his incumbency at Tow Law Espin was his own church organist until that duty was eventually taken over by a parishioner Mr. Robert Minto who continued to hold the office for well over half a century. The many contributions which Espin made to the press display an individual style soon recognisable as proceeding from a writer with a command of vocabulary, and in the more strict literary sense such was manifest in parish affairs e.g. on one occasion he wrote a play which was acted by the boys and girls of the congregation.

The vicar did not engage very much in sporting activities, and he used the hard tennis court in the grounds of the vicarage far less than did his parishioners. When he did play tennis his style made it seem that he had been a player in his younger days. There was - and still is - a well-patronised football team at Tow Law which was in the Northern League and it may well be that he gave it some financial support : it is however known with absolute certainty that he was resolutely opposed to football played on Good Friday.

So far as ecclesiastical matters were concerned Espin was withdrawn. He often absented himself from the regular meetings of the clergy of the rural deanery and had little interest in the proceedings of the Church Assembly. Such

conduct was in marked contrast with that of his distinguished father who was Prolocutor of Convocation for the Province of York from 1888 to 1908 and before that Chancellor, first of the diocese of Chester in 1873, and next of Liverpool from 1880. In the carrying out of church services there remains the common impression that he was precise and authoritative, but not so far as to be arrogant. He did, in fact, permit male members of the congregation to read the Lessons at Matins and Evensong on Sundays, but those chosen were always men of status : Mr. J.T. Palmer the schoolmaster, and Mr. Morton Hedley a colliery manager, churchwarden, and eventually an executor of Espin's second Will, are examples.

When the church of S. Philip and S. James was erected at Tow Law prior to the formation of the ecclesiastical parish on 2nd April 1878, its south-western corner had a low square tower, the intention being to leave this to be converted into a steeple by the addition of a spire at a later date when opportunity - and finance - combined to permit it. The matter was not without controversy when such came about for the sum of one hundred pounds was required for the work and that was thought by several churchgoers to be too high a price to pay for 'a finger pointing to God' . Espin, as incumbent, was of course in 'real, actual and corporal possession' of the entire church fabric and he exercised personal control in the affair. The resistance was of no avail despite the cost and the spire, with a set of tubular bells (somewhat unusual at that time) and a gilded weathercock, were completed in 1902.

Espin, His Life and Work

The cure of souls as the phrase goes has always been a paramount duty of any beneficed clergyman and such was taken by Espin to include not only the spiritual but also the bodily aspects. It was his practice to accompany pastoral work with the treatment of physical ills and he ventured into medical activities, thereby incurring the hostility of a local doctor, Dr. John Henry Naismith, of Grove Lodge, Tow Law. This animus long continued until an occasion when a united service of thanksgiving attended by the British Legion was held in the parish church on 9th November 1930. Dr. Naismith, a Presbyterian, was present at this function and it is reputed that he was so impressed by the sermon which the vicar preached, that good feeling between the two was largely restored. This sermon on the theme 'Man - A Symmetry' was subsequently printed and a copy of it, signed by Espin, accompanies this paper.

Instances of the range of Espin's curative work embrace his use of X-ray apparatus for medical diagnosis, his small private tuberculosis sanatorium, the use of ionic medication, and his dispensation of nourishments to the old and needy. Of these things a full account is given in a later chapter.

It does seem that Espin's choice of a celibate life caused his attitude towards women to be one of reserve rather than outright antipathy and may have been due to shyness. His bachelor state not being subject to the natural obligations and privileges of matrimony, gave full freedom for his application to scientific pursuits which were a preoccupation for the major part of his life. Nevertheless there were several ladies with whom he came into contact in his religious and civil

activities and they will be mentioned briefly.

During the curacy of the Revd. John Michael M.A. (Oxon) which extended from 1896 to 1911 he had for part of that time a lady lay-worker in the parish. She was Miss Head who lived in the Mission House close to the junction of Grove Road and Ironworks Road. After her departure the same house was occupied by the next curate the Revd. Thomas Bertram Weatherell B.A. until Espin purchased the house 'North View' in Station Road, whereupon Weatherell was installed there. In passing it may be said that there has never been a mission church in Tow Law parish so the name 'Mission House' was descriptive of the function of its occupant and not intended to indicate its attachment to any consecrated building subservient to the parish church.

Miss Siddons of Honley, near Huddersfield, was a wealthy patroness of Espin and much his elder. She belonged to the Jessop side of his family and visits between them were exchanged. Her solicitude was such that on one occasion she presented him with a foot muff of buffalo hide in order that his feet might be kept warm in the observatory during his regular nightly vigils.

Miss Julia Compton, who many years before had held the infant Espin in her arms when he was baptised in the church of S. James-the-Less at Hadleigh, always took an interest in all aspects of his work. As related elswhere it was due to this lady that 'Compton' was added to Espin's designation. She died in 1893. During her lifetime she was a generous benefactress and in her Will provided for him a legacy which

was used to purchase an 8-inch photographic telescope. (3)

Miss E. Brown who was an amateur astronomer of some standing, specialising in solar observations, was enlisted with others by Espin to aid him in the production of the 5th edition of 'Celestial Objects for Common Telescopes' published in 1893 and 1894.(4) Her death occurred in 1899.

Miss Brook, also an observer, was a liberal friend of the Wolsingham Observatory, as indeed Espin gratefully acknowledged when she died in 1894. (5)

Finally it is noticed in the Wolsingham Observatory Report for 1891 that two ladies sufficiently appreciated Espin to the extent of sending him gifts. Mrs Macdona remitted two guineas and Miss Holroyd two pounds. They must have liked him, or his work, or both.

For one in his station it was an odd circumstance that he never owned a horse and carriage nor a motor car. His movements were on foot, by train from the nearby station, or by taxi hired from either Mr. Wheatley or from the firm of Baldwin and Barlow, both of Tow Law. Every year he took a holiday of six weeks, usually abroad, and upon his return it was the custom to salute him by the firing of the cannon owned by the Church Lads Brigade. After 1912 he was usually accompanied on these vacations by Mr. William Milburn his astronomical assistant.

This indulgence in foreign travel dated from his days as a student at Haileybury. Indeed in oneof the publications of the Wolsingham Observatory (c. 1893) entitled 'Twenty Years' Observations of Thunderstorms' mention is made of incidents which occurred at Aachen See in 1875, in Paris

in 1880, and on another occasion at Neuhausen. He spent several weeks in Mürren in the Bernese Oberland in the summer of 1885. In a letter of 1900 (6) he recalled visits to Heiden in Switzerland, Naples, and Mentone. Mr. Milburn was with him when he visited Florence and it is known that le Puy de Dôme and Vesuvius were included in his journeys.

In July 1884 he spent the greater part of the month on the Rigi Scheideck in Switzerland at an altitude of over 5,000 feet where he devoted much of his time in the evenings to the observation of the atmospheric absorption of starlight. He was then twenty six years of age and the data he obtained formed the basis of a paper by Professor E.C. Pickering of Harvard College Observatory, which is detailed elswhere.

Even in the most recondite person there often reposes a vein of humour and in the case of the incumbent of the Tow Law parish such underlaid the combined dignities - or burdens as choice may have it - of priest, magistrate, and scientist. On rare occasions it rose to the surface and went so far as to appear in print. One example is narrated in the later section concerned with double stars and others appear in the scrapbook extracts contained in the dossier. There are several more of which a short selection will now be given.

His most audacious act occurred in 1888 towards the end of his time at Wolsingham. Espin, abetted by some friends essayed an incursion into the finances of the Royal Society - a clear case of dignity and impudence. At the time he owed sixty pounds for his 17·25-inch equatorial telescope, and upon learning of a Government grant to the society and in an evident

spirit of levity, he applied to the society for a share, basing his claim on the extent of the astronomical work he had done and was continuing to pursue. The committee concerned apparently considered the request frivolous, for he received back a terse, undated, and negative, reply. (7)

Rather earlier than this an event occurred during Espin's Oxford days (1878-1881) but since it entailed some embarrassment he discreetly remained silent about it for the next thirty years before recounting details - harmless though they be - in the pages of the English Mechanic. (8) In this he acted wisely, for what at the time could have been disconcerting in the career of a young ordinand, mellowed with the passage of time to become merely a diverting reminiscence.

The episode began when the Revd. Herbert Sadler, an astronomer friend was seeing Espin off from a London railway station. Espin had previously observed a rather dark plain on the Moon known as Mare Crisium, and as the train started to move off Sadler called out 'Take care of Mare Crisium' . When Espin turned to take his seat he found that the only other occupant of the carriage was a nun in the full habit of her Order whose expression made it apparent that she took the remark to apply to her. There ensued an uneasy silence until the first stopping place was reached, whereupon 'Sister Mare Crisium' fled, much to the relief of Espin.

An account of the erection of his observatory at Wolsingham in 1885 which was impeded by the inquisitive populace and of its removal to Tow Law in 1888 where the young people believed it to be - inter alia - a travelling circus, was given

by Espin in a very humorous letter (9) . His anecdote in this same note of the cow which looked down a telescope from the object-glass end whilst an observer was looking the other way from the eyepiece end – thus causing the singular occultation of the Moon – is delicious. Finally the correspondence which Espin published in January 1911 regarding his cat 'Kip' which a Ramsgate lady thought might be her lost prophet 'Jeremiah' will bear perusal (10) .

He had, too, moments of disappointment. An instance of this took place in 1893 when a paper he sought to publish on 'The Distribution of Stars of Type III and of Stellar Spectra in Space' was rejected. This was not altogether surprising for Espin suggested in it bifurcations in the Milky Way. He was not, however, deterred but published it himself in January 1894. His philosophy of repulse was contained in a preface and expressed in these words 'A suggestion, however faulty and imperfect, may sometimes contain a grain of truth, or even in showing up its improbability a step may be gained towards the truth itself. For this purpose, then, it is put forth, and as an attempt to explain impressions derived from hours spent in sweeping the heavens ; and if new facts were to falsify it to-morrow it would be withdrawn as frankly as it is put forward to-day'.

The year was still 1894 when Espin's most severe misfortune befell. On 22nd December of that year a great gale swept over the exposed fells on which Tow Law is built, and amongst the damage wrought was the destruction of the observatory in the grounds of the vicarage (11) . The dome of the structure

was 20 feet in diameter and made of wood covered with zinc. It also had shutters which folded back to give the telescope within a free view of the sky. Probably these were blown out by the storm for the wind lifted the main part of the dome over a five foot wall and carried it 14 yards before it crashed. Fragments were swept hundreds of yards, but fortunately the telescope was not damaged. Photocopies showing the destruction are in the dossier.

Any despondency which Espin may have had must have been soon relieved for Captain Jessop (a relative in his maternal line) and Mr. C. L. Brook (thought to be a member of the family of Miss Brook mentioned earlier) jointly paid for a new and more elaborate dome. Observational work restarted in the new observatory on 14th April 1895. (12)

There was a wide variety of pursuits which Espin took up from time to time : the most notable of which are described in another section. He had lesser pastimes such as his aquarium containing exotic fishes, his hard tennis court in the vicarage grounds [illegible] amongst the first laid in England, his searches for mosses and lichens, and his polishing of ammonites. At one time – about 1930 – he had two goats. During his foreign travels he collected geological specimens from Etna, Vesuvius, and le Puy de Dôme. In this varied list the aquarium was, perhaps, the most attractive. It was a glass box about four feet long, two feet wide, and two feet deep. For warmth it was placed in his 'den' and aeration was assisted by water plants. He had a Missouri catfish and some Mexican species in it, and in addition, in a separate container, he kept newts

whose habits he studied very intently.

When 'wireless' became a popular pastime in the late 1920's very oddly it had no appeal at all for Espin, which is remarkable in view of his immediate attraction towards X-ray work in 1896 and the lectures he is known to have given on 'Electricity'. Of course by then his years were well advanced, he would be in his middle sixties, and it does seem that he was an onlooker whilst this development was taking place. In fact he never possessed a wireless set of his own.

The Vicar of Tow Law was President of the Newcastle Astronomical Society from its inception in 1904 until his death thirty years later : a Fellow of the Royal Astronomical Society from the age of nineteen, and a member of the Double Star Commission of the International Astronomical Union. He took up memberships of foreign societies. First he became a Corresponding Member of the Royal Astronomical Society of Canada in 1893 : the Astronomical Society of Mexico made him a Fellow in 1911, and the American Astronomical Society elected him a Member in 1913. In 1914 he gained a Fellowship of the American Astronomical and Astrophysical Society. It is highly probable that he would have become Director of the Armagh Observatory when this office fell vacant in 1918 had he applied for it, but as it so happened his old friend the Revd. F. W. A. Ellison - an Irishman - who, incidentally held curacies in the diocese of Durham at Tudhoe (1890-1893) and Monkwearmouth (1893-1899), was appointed to the post.

In the public life of his day Espin was a Justice of the Peace for thirty five years and Chairman of the Petty

Sessions at Wolsingham and Stanhope. Ecclesiastical preferment was never his aspiration and he remained as the incumbent at Tow Law for forty six years (1888-1934). By repute, and nothing more, Espin was a Freemason, but he never attended meetings of the local lodge at Tow Law.

Let now the diverse qualities be weighed together and Espin judged as a whole. First he was a priest, next a pastor, and third a scientist. The intent of this present work being to examine the last attribute it is proper to keep in mind the former distinctive segments of his life in order that a balance may be preserved. To that end a brief sketch follows.

Conviction in the faith of the Established Church of England was paramount, and thereby prejudice in religious matters was not wholly to be excluded. His position fostered such an attitude. He was the lawful pastor of the parish of Tow Law in apostolic succession from the founders of Christianity. Confession could be made to him. Such powers tend to enhance the self-esteem of a man, and when they were allied to authority as a civil magistrate, eminence rises even higher with this secular support.

Much natural humility was needed to contain an elevated dignity when dealing with the comparatively humble folk who comprised the Tow Law flock. Espin's security of freehold enabled mundane matters to be subordinated to academic ones. He was at the opposite end of the social scale when compared with his parishioners. But with this cold recital of facts there goes evidence to show that in all matters he acted justly

and kindly, according to his lights. For close on half a century he applied himself to the wellbeing of his parish and in that span must have done much of which nothing has been, nor ever will be, written. And what he did not accomplish in his immediate locality he more than offset in contributions to knowledge generally and to astronomy in particular.

In concluding this chapter the provisions made for his eventual retirement merit some description. Espin took the first steps in that direction many years before his decease as will be explained more fully later when dealing with his Will and estate. One primary purpose he sought to achieve was the continuation of astronomical work at Tow Law under the aegis of his old University - Oxford, but which in the event never came about. Here an outline only of facts material to the preceding text is given.

Just across the railway line which ran alongside the vicarage there was a cul-de-sac, at the closed end of which stood a double-fronted house, stone-built, known as 'North View'. This for a time had been the residence of Dr. Denniss, a partner in the medical practice of Naismith and Denniss. The property comprised about a third of an acre of land and had an open aspect to the south, east, and north. Espin purchased it during the First World War (1914-1918) with a view to residing there in his retirement. The curate of the parish at the time was the Revd. Thomas Bertram Weatherell B.A. who occupied that office from 1911 to 1935, and who had hitherto resided in the Mission House. Espin thought well of his curate and left much of the social work of the parish in his hands, so it was a natural and considerate

act on the vicar's part to let North View to Mr. Weatherell who remained there right to the end of his stay at Tow Law.

Espin's anticipation of retirement was never fulfilled for he remained in office until his death and actually died in the vicarage. The statement in the opening lines of his last Will executed on 3rd August 1920 in which he described himself as 'of North View Tow Law' was therefore strictly incorrect : he was undoubtedly the owner at the time but not the occupier.

Upon Espin's decease his possessions had of necessity to be removed from the vicarage at rather short notice and dispersed in accordance with the provisions of his Will and its codicils. Accordingly when Mr. Weatherell left Tow Law in 1935 to become Rector of Christ Church, Jarrow Grange, Mr. William Milburn, Espin's astronomical assistant, moved into North View and equipped two observatories in its grounds. The smaller one, made of wood, had a domed roof and was used to house a 5-inch refracting telescope. The larger observatory was constructed of yellow bricks obtained from demolition materials on the site of the disused West Thornley Colliery (closed in 1928) and accommodated the 24-inch reflector. Espin's 17·25-inch reflector was not put to further use after his death. Both observatories still stand, forlorn, and photographs of them are to be seen in the dossier.

Observational work by Mr. Milburn continued in these two observatories until the outbreak of hostilities in 1939 when the restrictions imposed by war virtually forced the abandonment of further astronomical work. Thus it was that in the Monthly

Notices of the Royal Astronomical Society for February 1940 Mr. Milburn made his last contribution, ending it with these words 'Owing to A.R.P. activities and lighting restrictions observing was discontinued, except for the use of the 5-inch refractor for the benefit of visitors'.

That terse epilogue marked the end of an era which began when Espin then a youth of sixteen at Haileybury became imbued with zeal for astronomy upon seeing the brilliant comet discovered by Coggia on 17th April 1874 and was encouraged in that pursuit by the Revd. Frederic John Hall. It extended over the prolonged span of sixty five years of unbroken observational activity. It is depressing to reflect that this superb record originating in a schoolboy and which yielded so much on things hitherto unknown, should be ended by the grim demands of human conflict.

The street in which North View stands was formerly known as Wesley Street, probably because the Wesleyan School was there and it is so described in the Ordnance Survey Revision of the area carried out in 1895. Since, however, the main access to Tow Law Railway Station was obtained from it the thoroughfare took on the name of Station Street which it still retains. Whilst Mr. Milburn was its occupant the local name of 'The Observatory' was given to the house, but to-day (1972) it is named 'The Sycamores' after the trees in the garden. It is No. 18 Station Street. The old Wesleyan School is now a factory, but of the station and the railway nothing whatever remains.

(References follow on the next page)

References :-

1 H : p. 98.

2 Mr. B. Shuttleworth of Newcombe House, Market Place, Wolsingham, a local historian, supplied this information.

3 WOR : 1892.

4 O : Jan. 1894 : p. 57.

5 WOR : 1893.

6 EM : 10-8-1900 : LXXI : p. 564.

7 EM : 8-6-1888 : XLVII : p. 326.

8 EM : 17-12-1909 : XC : p. 466.

9 EM : 26-4-1889 : XLIX : pp. 175-176.

10 EM : 20-1-1911 : XCII : p. 559.

11 EM : 25-1-1895 : LX : pp. 521-522.

12 WOR : 1894. and MNRAS : Feb. 1896 : LVI : p. 238.

CHAPTER VII

CHURCH ACTIVITIES

It is of interest to review the manner in which a country clergyman committed to the care of a working class parish in the remoteness of north-west Durham catered, through his church organisations, for the life of the people in the days before radio, television, motor-cars, and the like, came into common use. Of necessity they had to make their own diversions suited to the seasons and in so doing much originality was shown. It is open to question whether the scientific advances made over the last half century have added to human happiness, or merely substituted transient pleasures for what before was a more deep-seated contentment.

These pastimes, though briefly described, appear juvenile as indeed many of them were and their very simplicity make them seem trifling compared with Espin's researches into stellar space which will be examined in the next chapter. Should this impression arise let it be remembered that the greatest of all inventions - the wheel - is also the simplest. With common tools the most elegant edifices have been raised.

To begin. From 1897 onwards there was a strong contingent of the Church Lads Brigade (abbreviated C.L.B.) identified with the church at Tow Law. This organisation was founded by Col. W.M. Gee on 1st November 1891 and had two divisions : the Junior Training Corps designed for boys between 10 and 14 years of age, and the Church Lada Brigade proper, which took in boys between 14 and 21 years. Only the

senior branch functioned at Tow Law in Espin's time and it had about 60 members. The curate was Captain and under him were adult men who acted as Lieutenant and Staff-Sergeants. These youths had a muzzle-loading cannon to which they were greatly attached and they often took it to the nearby fells for amusement and training. With the aid of a ramrod, black powder, paper, and chunks of turf, the weapon was charged and firing was done by applying a match to the touch-hole - the turf being the projectile.

On one occasion a youth by mischance ignited the cannon whilst his hand was near the muzzle. The weapon fired and burnt several of his fingers, fortunately not seriously. However, the ramrod which had been in the gun barrel, shot out and narrowly missed the head of Mr. Espin.

With a membership somewhat older than that of the church scouts (mentioned later) the C.L.B. occupied itself with physical exercises, drills, games, and uniformed church parades, headed by its band. There were occasions when some senior scouts combined with the C.L.B. in large-scale 'attack-and-defence' by taking the train to Burnhill about four miles from Tow Law, and using binoculars to assist them, sought to infiltrate the vicarage grounds held by defenders. In this no success was ever achieved, but great enjoyment resulted.

A scout troup was attached to the Presbyterian Church at Tow Law and it formed one of the units of the Boy Scout movement founded in 1908 by Lieutenant General Robert Stephenson Smyth Baden-Powell (later knighted and raised to the peerage). One of the principles of this movement is that a Boy Scout

shall have complete freedom of choice in his religious beliefs. Espin, being firmly attached to the Establishment, inclined to the view that the boys of his flock should be specifically identified with his church, and accordingly he established his own 'church scouts' (for want of a better name) whose allegiance was to the parish church of S. Philip and S. James. In doing this Espin was not alone : other parishes had church scouts too. These scouts had for their members boys up to the age of 14 years i.e. those too young to join the C.L.B. and their numbers varied but at one time they rose as high as 40, comprised in five platoons each with seven boys and a leader. The scoutmaster who had overall charge was an adult.

The church scouts engaged in a variety of games. In summer a very popular one was to organise a paper chase over the fells. Another was multiple 'attack-and-defence' in which scouts formed themselves into groups, each of which set up a 'stronghold' on the fells, which were about half a mile apart. Boys from any one 'stronghold' attacked any or all of the others and victory was achieved when attackers penetrated a defensive position and lit a fire in it. A feature of this game was that when a boy touched an opponent the latter was considered to be 'dead'.

The enduring pastime of pretending to be Indians in a wood had a variant at Tow Law. Balls of wet paper were made up and a supply was carried by each boy, who also wore a scarf. They aimed these balls at each other and anyone hit had to give up his scarf to his opponent who tucked it into his belt as a 'scalp'. This was a stimulating game and well favoured in

summertime.

In winter the 'coloured light' game was played when the weather was fine. Boys were divided up into groups, each one of which had its own colour e.g. green, red, blue, ... etc. The game took place at night and groups assembled at a spot near to where the Roman Catholic Church now stands. A coloured light was placed in one of the upstairs windows of the vicarage and it was for the group whose colour was shown to resist capture by the other groups. This game persisted throughout the Edwardian era (1901-1910) .

Espin had a shooting gallery built in the grounds of the vicarage. This was a wooden tunnel about five feet high, open at one end where the would-be marksman stood, and closed at the other end to accommodate a target. Near to the closed end was an access door. An air rifle and pellets were provided by the vicar and each boy, in turn, fired at the target : he with the highest score won a prize. The C.L.B. used this shooting gallery as well as the scouts.

For girls of his parish there existed a Girls Club which had a membership as high as 30. Two of its leaders, still remembered, were Miss Michael, daughter of the curate the Revd. J. Michael, and Miss Head. It was mainly social and concerned itself with domestic crafts and dancing.

The adult men had provided a diversion entirely their own which flourished in the winter evenings during the opening years of this century. It was under the direct patronage of the vicar and took the form of what then were known as whist drives. Now at that time the venture was rather a

bold one for card-playing was often condemned - especially by Nonconformists - as a snare of Satan, and in promoting it Espin showed far more liberality than many contemporary clergy. Membership was limited to thirteen so that, with one spare, they could form three tables of four players each. In the autumn the first of these whist-drives took place at the vicarage and thereafter for the duration of the winter it circulated amongst the homes of the members. Because there were twelve players the group members were nicknamed, very appropriately, the 'twelve apostles'.

One especial concern of Espin was his appraisal of the moral worth of those young men with whom he came into contact, and when such was allied to intelligence and an attachment to the tenets of the Church of England he directed their thoughts towards ordination. Thus Thomas Bertram Weatherell was assisted to enter the College of the Resurrection at Mirfield in Yorkshire in 1903. He graduated B.A. at Leeds University in 1907 and later became curate of Tow Law parish from 1911 to 1935.

Thomas Vickers was another Tow Law youth. He became a student at Hatfield Hall in Durham University whence he graduated B.A. in 1909 and after ordination went to the mission field in East Africa. So too was Arthur Richardson Stobbs, a graduate of S. Chad's Hall at Durham in 1915, who, after holding curacies and vicarages in the diocese of Durham became Vicar of a parish in Lincolnshire. Brief summaries of the careers of these men during the lifetime of Espin are noted in the dossier.

The advent of the First World War (1914–1918) greatly reduced the youth organisations. Many who had been members became soldiers and the names of some who fell still remain inscribed on the War Memorial at the junction of High Street and Bridge Street. After the war ended, about 1919, a Boys Club and a Girls Club existed together. Each met at the school – now burnt down. The boys engaged in chess, whist, draughts, boxing, and – oddly enough – in learning how to dance. The activities of the girls were social ones, but once a month during the winter time the boys and girls met for a dance and games.

The spread of wireless broadcasting in the 1920's, the establishment of a cinema in the High Street, and the formation of a workmen's club, were some of the diversions which, in common with the experiences in many other parishes, tended to weaken the former strong religious attachments and this affected all organisations allied to the parish church. The C.L.B. after many ups and downs remains, and there is now (1972) both a Mothers Union and a Parochial Church Council, the last-named coming into existence after Espin's decease, but the native ingenuity in devising self-made enjoyment so evident in former times is forever gone.

Note :–

Much of the information contained in this chapter has been supplied by Mr. Roland Heslop of Victoria House, 46 High Street, Tow Law, a lifelong resident of the parish and whose connection with the church dates from his childhood.

CHAPTER VIII

ASTRONOMICAL WORK TAKEN AS A WHOLE

In surveying the whole field of observational activity in which Espin engaged for well over half a century there can be seen certain natural divisions into which this extensive labour falls, and although the boundaries which separate one division from another are not sharply defined, an analysis based on them will, it is thought, provide a convenient and explicit method of examination.

They relate to the specific objectives which Espin had in view from time to time. After exhausting his enquiry into one he proceeded to another. Occasionally there was overlap and even reversion, but in general terms the following five main headings embrace the major part of his life's work. They are :-

1 The variable stars
2 The red stars
3 Stars with remarkable spectra
4 The double stars
5 The discovery of Nova Lacertae

Each one will be dealt with in turn, but first some preliminary notes are necessary on Espin's assessment of star magnitudes, and on the Secchi system of star classification which he used for many years.

STAR MAGNITUDES

A decision as to what magnitude should be assigned to to a stellar object was very much a matter of personal opinion in the XIX century. From Sir John Herschel's statement that the light received from an average first magnitude star was approximately one hundred times that from an average sixth

magnitude star there was derived a light ratio of $\sqrt[5]{100}$ or 2•512 between magnitudes. F. W. A. Argelander (mentioned later) adopted a ratio of 2•5, and Norman Robert Pogson suggested the ratio whose common logarithm was 0•4 i.e. the natural number 2•512 as just given. This was the ratio originally used in the Pogson Scale (1856) and afterwards came to be selected in the photometric scale.

During the last quarter of the XIX century and after, Professor E.C. Pickering at the Harvard College Observatory in the U.S.A. determined the magnitudes of fixed stars by use of a meridian photometer. When referred to the Harvard photometric scale the magnitudes allotted to faint stars by early observers such as both Herschels and F.G.W. von Struve, were numerically too high, or in other words they under-estimated.

In particular two catalogues which gave star magnitudes were sources of reference when Espin first began to take an interest in astronomy. One was the Uranometria Nova of 1837 which gave the magnitudes of all stars visible to the naked eye, and the other the Bonner Durchmusterung (1863) in which the positions and magnitudes of all stars in the northern sky down to the ninth magnitude were stated, a total of 324,198 objects. Both volumes were the work of F.W.A. Argelander (1799-1875).

This durchmusterung is still regarded as one of the most imposing contributions to astronomical records ever made, but in saying this regard has to be paid to the pace at which it was compiled, and therefrom the degree of reliability which may be placed upon its contents. The Revd. Herbert Sadler, an astronomer friend of Espin and a man of probity, calculated

that on average Argelander must have noted eight stars a minute for R.A., declination, and magnitude : in richer areas of the sky this rate rose to sixteen a minute, and in the most crowded parts twenty a minute. These are truly astonishing figures and one, surely, is justified in having some reservations on the magnitudes so obtained.

The foregoing is the barest of outlines of a situation to which more detail could be added. However it is to the personal work of Espin that attention has to be directed, and this extended from his sixteenth year until his seventy sixth. The purpose in hand, therefore, is to elucidate the methods he employed in arriving at magnitudes over this space of sixty years.

The first magnitude scale used by Espin was that of Mr. R.A. Proctor, and which he specified in a list of eighteen red stars compiled in 1878. (1) Richard Anthony Proctor it may be said was a brilliant amateur astronomer who successfully challenged the judgment of the Astronomer-Royal in the matter of a transit of Venus. Less than a year later (2) Espin prepared a list of eighty six stars in respect of which he gave a comparative table of their magnitudes as found by Heis, Herschel, and himself. In it there were close agreements and equally wide differences, amounting in the case of 51 Eridani to 1·3 magnitudes. There was not a single case of complete agreement.

Proctor evidently fell from favour quite soon. In March 1879 Espin wrote .....'The B.A.C. magnitudes adopted by Mr. Proctor are so erroneous' ..... (3). By B.A.C. he meant the British Association Catalogue, and he now fixed upon

the scale of Heis which was utilized in an accompanying list of thirty two stars in the constellation Monoceros.

The accuracy of star magnitudes was a matter which led Prof. Charles Pritchard, Savilian Professor of Astronomy at Oxford, to read a paper before the Royal Astronomical Society in 1881 on a 'Method of Measuring Relative Brightness of Stars' . Espin, upon perusing this, pointed out - rightly - that a most important factor had been passed over, namely, the change in sensitivity of the eye of an observer during his work. He advanced the opinion. which went without challenge, that sensitivity increased as observational time progressed, and this, he thought, went far to negative the supposed advantages of mechanical means devised for finding magnitudes. For this especial reason Espin told of his abandonment of all other means in favour of the method of simple sequencing with opera glasses (4), and went on to list nine stars in Cetus whose magnitudes as obtained by himself using opera glasses were compared with the corresponding magnitudes assigned to them by Dr. B.A. Gould (an observer of southern stars and author of the 'Uranometria Argentina') . Agreement was exact in one case and nowhere in excess of 0•3 magnitude for the remainder.

The use of opera glasses proved to be most acceptable to Espin and he gained a recruit in the person of Mr. T. Read who joined with him in the determination of the magnitudes of twenty six stars in the constellations Ursae Minoris and Draconis as a test of the method. Their published results showed that in twenty one cases the magnitude differences between the two independent sets of observations were less than a quarter of a

magnitude (5) . With such a favourable outcome they were well satisfied, but an amateur astronomical Martinet, Mr. Maitland Baird Gemmill of Glasgow, quickly pointed out that an omission had been made in their work. Espin and Read, he noted, had selected independent comparison stars without common prior agreement as to their magnitudes - an obvious oversight, and in a constructive manner proceeded to detail his own, rather exact, method using Capella and Vega as normal first magnitude comparison stars (6) .

Espin's contemporaries were not at all clear as to what he implied by 'simple sequencing' with opera glasses, so he set out the details in a letter in April 1882 (7) . A copy is in the dossier but here a summary may be given. First he assumed magnitudes for standard stars and from these interpolated intermediate magnitudes. Any new star examined was compared with the standards and sometimes with the intermediary stars as a check. He used for his observations a pair of opera glasses placed slightly out of focus so that the objects viewed appeared as discs of light, and he observed a new star alternately with a comparison star many times until no doubt remained in his mind as to the relative brightness of the new object. The limit of the method was considered by Espin to be a magnitude above the minimum visible, and he did not go further than 6·0.

The photometer which Espin made in 1883 whose accuracy was within 0·1 of a magnitude was a marked advance on all previous endeavours and it is described later. With it he passed from the qualitative stage to the quantative, but he did on occasion employ magnitude figures given by early observers.

Thus in September 1883 when referring to arrangements made by the Liverpool Astronomical Society for team work on variable stars during the 1883-1884 session he selected comparison stars in the northern sky from Heis's 'Atlas Coelestis' . In March 1886 in an article on new red stars a comparison is shown of estimations of magnitude made by Argelander and himself (8) . As may be seen on p. 17 of the accompanying copy of 'The Red Stars' (1890) Espin brought together hundreds of magnitude determinations made by Birmingham, Copeland, Dreyer, Webb, and Pickering, in addition to his own.

The use by Espin of early magnitude scales declined in the 1890's almost to vanishing point. Only one definite allusion has been found (9) when he used Struve's scale. They were supplanted by the more authoritative Harvard photometry from which star magnitudes were quoted freely in 1897 (10) and mention was made in 1898 (11) . Quite apart from this the Nautical Almanac had provided data on star magnitudes for decades but this source was so little named that it remains uncertain as to what extent amateur observers made use of it.

The edition of the Almanac for 1882 provided the exact magnitudes of 197 stars : that for 1892 contained magnitudes of 229 stars. By 1902 the total had risen to 392 stars, and each of these annual issues cost only 2/6d each. The probability is that Espin would select from this reliable source such comparison stars as he needed when assessing magnitudes of stars intermediate between the chosen reference standards, and in passing it may be mentioned that Capt. W. Noble F.R.A.S. who for many years wrote a popular 'Monthly Notes' feature in the

English Mechanic stated specifically, in 1902, that the magnitudes which he gave were taken from the Nautical Almanac (12), although even he referred in this particular to the Harvard photometry. Noble employed a negative magnitude (-1•4) for Sirius as long ago as 1899 (13) .

Mr. T.W. Backhouse of Sunderland in County Durham and a contemporary of Espin was particularly concerned with star magnitudes and published a catalogue of the magnitudes of 9,842 objects visible to the naked eye in 1911. He was a great friend and thus Espin had at hand a convenient and trustworthy local fount. Finally Professor E.C. Pickering of Harvard College Observatory who initiated photographic magnitudes, gave details in 1910 of this scale and its reconciliation with the photometric scale. Espin and Pickering had been friends from 1883 but Mr. Milburn confirms the statement that Espin never employed thg photographic means, no did he : the photometric method remained as their ultimate resource.

To sum up. In the determination of magnitudes Espin from his sixteenth to his twenty fifth year (1874-1883) at first relied largely upon visual observation and often employed the scales of early observers : later he based his estimations on the method of sequencing with opera glasses. From 1883 he had available his photometer with an accuracy of a tenth of a magnitude. Magnitudes of comparison stars were available at all times from the Nautical Almanac, and from 1897 these were supplemented with some taken from the Harvard photometry. Espin never determined magnitudes by photographic means, and neither he nor Milburn ever used absolute magnitudes.

References :-

1	EM	22-2-1878	XXVI	p. 574.
2	EM	17-1-1879	XXVIII	p. 473.
3	EM	7-3-1879	XXVIII	p. 628.
4	EM	25-11-1881	XXXIV	p. 281.
5	EM	30-12-1881	XXXIV	p. 400.
6	EM	17-3-1882	XXXV	pp. 32-33.
7	EM	14-4-1882	XXXV	pp. 126-127.
8	MNRAS	March 1886	XLVI	pp. 293-297.
9	AA	1893	12	p. 282.
10	EM	29-10-1897	LXVI	p. 251.
11	EM	2-12-1898	LXVIII	pp. 370-371.
12	EM	14-3-1902	LXXV	p. 93.
13	EM	6-10-1899	LXX	p. 184.

THE SECCHI CLASSIFICATION OF STAR SPECTRA

At the 38th meeting of the British Association for the Advancement of Science held at Norwich in August 1868 a communication was received from Padre Secchi entitled 'On Stellar Spectroscopy' and it was considered to be of sufficient importance for it to be printed in extenso. The author, to give a full description was Fr. Angelo Secchi S.J. of the Collegio Romano, Rome, and his contribution to the classification of star spectra thus made was probably one of the most important hitherto. In brief Secchi divided stellar spectra as follows : the text being largely couched in his actual words :-

Type I - Numerous : almost one half of the visible stars. Colour tends towards the blue end of the spectrum and occasionally to the green. All the white stars are included in this class.

Type II - The rich yellow stars : very numerous and they embrace almost the other half of the stars.

Type III - The orange or reddish stars.

Type IV - The red stars , all below the sixth magnitude.

All the spectra of the third and fourth types belong to variable stars.

Secchi was not alone in his spectroscopic work ; he referred in his paper to Fraunhofer, Donati, and Huggins. The last-named, indeed, carried out investigations complementary with those of Secchi, for whilst, at Rome, and with less precise equipment Secchi examined the spectra of over 4,000 stars, at Tulse Hill Observatory in London Dr. William Huggins concentrated on the identification of stellar elements and to that end observed the brighter stars with as great a dispersion as he could use. In concise terms Secchi's field of work was extensive and

generalised : Huggins was far narrower and specialised. Rutherfurd, it may be added, had carried out spectroscopic work also but moved thence to other avenues of research.

The Secchi star spectra classification had been available and in use for almost eight years by the time Espin made his first press contribution to the English Mechanic on 5th May 1876. He, of course, used it, and fourteen years later - in 1890 - when his edition of 'The Red Stars' was published by the Royal Irish Academy he devoted eight pages (pp. 96-103) of that large volume to an examination of Secchi's groups and to the competing claims of the alternate system proposed by Dr. H.C. Vogel of the Astrophysical Observatory at Potsdam, which comprised three main groups divided into seven sub-groups.

There existed opposing schools of thought on the matter of spectral classes. Vogel's system was supported by Nils C. Dunèr and von Konkoly : that of Secchi by D'Arrest, Pechùle, and (at first) by Pickering of Harvard. The varied aspects of these matters are reviewed in the quotation made in the preceding paragraph and to which reference should be made for fuller details. The copy of 'The Red Stars' is included in the dossier for that purpose.

Espin in dealing with the red stars specifically stated (p. 103) his use of Types III and IV of the Secchi classification and in a note of disarming candour pointed out just how notably experts can differ amongst themselves. He quoted the findings of Secchi and Huggins regarding star Schj. 152 (p. 100) which were in direct opposition.

A reference by Espin occurred in 'The Red Stars' to the paper which Lockyer presented to the Royal Society on 17th November 1887 entitled 'Preliminary Note on the Spectra of Meteorites' (p. 103) . Had Lockyer's proposed system of three stages in the meteoric formation of stellar objects been adopted i.e. (1) increasing heat, (2) condensation, and (3) subsequent cooling, then both the Secchi and Vogel classifications would have been eliminated. Beyond this commentary nothing further is to be found on the subject in Espin's writings, and he never pursued the matter.

It is at this juncture relevant to refer to the survey of star spectra undertaken at Harvard College Observatory under Professor E.C. Pickering. Henry Draper, himself a pioneer in stellar spectroscopy, died prematurely in 1882, and in order to perpetuate his memory the first part of the Draper Memorial Catalogue, which involved the examination of 10,351 stars, was published in 1889 from Harvard. Of the 'Draper classification' more will appear, but now it is material to quote from Espin's communication to 'Nature' in 1891 on the topic of 'Photo-Stellar Spectra' (1). He wrote 'Professor Pickering, while retaining the four types of stellar spectra, finds that so many stars show an intermediate stage of development, that, in the Draper Catalogue, letters are substituted for the types. Thus, letters A to D denote stars of the first type ; E to L, stars of the second type ; M, stars of Type III. ; while N is reserved for fourth type stars' . Quite clearly the groundwork of Secchi and indeed of Vogel was proving to be a base for the evolution of the modern system of letters and their accompanying subdivisions.

An enquiry into the grouping of stellar spectra actually employed by Espin is now appropriate, and on this there is much by way of written record. First there appeared - as related elswhere in detail - sixteen contributions of his to the German journal Astronomische Nachrichten which appeared from 1887 to 1900. They were all tabular and one column headed 'Sp.' was devoted to spectra which were stated in every case on the Secchi classification. Publication No. 1 of the Liverpool Astronomical Society of 1887 gave a list of stars (Nos 142 to 185) and Espin frequently quoted Secchi types III and IV as applying to many of them. His Wolsingham Observatory Circulars (1887-1902) similarly adopted the Secchi system.

This fixity on Secchi was well borne out in Espin's frequent writings to astronomical journals. It is apparent in his contributions to the Astrophysical Journal in 1899, to The Observatory in 1890, and in two articles which appeared in the Monthly Notices of the Royal Astronomical Society in 1893 and 1894. To all of the foregoing a collective reference is appended. (2)

However, and probably it was inevitable, a change in usage came with the efflux of time. In 1913 he had published an article in the Journal of the Royal Astronomical Society of Canada. In it he particularly mentioned the Harvard Annals Vol. LVI, No. 1, and the researches of the late Mrs. Fleming of Harvard whose objects he then analysed into five divisions, using for that purpose the types A,B,F,G,K,M, and N, taken from the source quoted. In the next year, 1914, in the English Mechanic, whilst referring to Secchi types IV and V red

stars he once more called to mind Mrs. Fleming's work and the Harvard Photometry between the years 1887 and 1911. Again a combined reference is given for these items (3) . By 1914 Espin was fifty six years of age : his mind was active but his ways were set, and for two years past he had been aided by Mr. William Milburn.

Milburn, in fact, in a letter to the English Mechanic of 1919 when referring to star No. 295 of Espin's revision of 'The Red Stars' of 1890 said ....."For the Revised Harvard Photometry the spectrum is K2' ..... (4) so evidently by then the transition from Secchi, if not complete, was in progress. When Espin contributed his note on 'The Red Stars and the Draper Catalogue' to the Monthly Notices in 1924 he made a direct comparison of his own red star discoveries up to 1899, and post 1899, with the Draper classification (5). It is, possibly, of interest to note the headings under which he grouped his objects. One was N.R.S. which three classes are to-day recognised as defining the rare stars : M(abcd) equivalent to Secchi Type III : K,F, and G, separately, which when combined represent Secchi Type II. Under the heading of 'Others' he had remaining only 59 stars from a total of 3,932, i.e. almost exactly 98·5 per cent were classified and 1·5 per cent were not. To do this, in failing health and in his seventieth year, was a notable achievement.

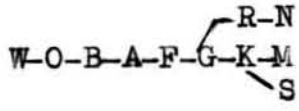
In bringing to its close this narration of the spectral types which Espin employed it may be said that up to about 1913 he folowed Secchi. For the next five or six years he inclined to - but did not regularly employ - the Draper classification.

Both he and Milburn thereafter fell in with the trend towards Draper, by when both the systems of Secchi and Vogel had become obsolete. To enable easy comparison of the old with the new the following broad equivalents may be used :-

Secchi	Type	I	...	...	Draper	classes	B and A.
..	..	II	...	...	..	..	F,G, and K.
..	..	III	...	...	..	..	M.
..	..	IV	...	...	..	..	N.

remembering that each Draper class has ten subdivisions e.g. A0, A1, A2, ... A9.

By now (1972) of course, the Draper classification has been extended by prefixing the Wolf-Rayet stars (class W) and the helium absorption stars (class O) at the 'early' and of the sequence, and by the branching of classes R and N from main class G. Taken together with the offshoot class S from main class K at the 'late' end, the sequence reads :-



About ninety nine per cent of stars are covered by the six classes B to M inclusive, and in the subdivisions spaces still remain to be filled by stars as yet undiscovered.

(References follow on the next page)

References :-

1 N : 11-6-1891 : 44 : pp. 133-134.

2 Combined reference :-
AJ : 1899 : 10 : pp. 169-172.
O : Dec. 1890 : XIII : p. 393.
MNRAS : Dec. 1893 : LIV : pp. 100-102.
MNRAS : Mar. 1894 : LIV : pp. 325-327.

3 Combined reference :-
JRASC : 1913 : VII : pp. 79-87.
EM : 23-10-1914 : C : pp. 279-280.

4 EM : 11-4-1919 : CIX : p. 140.

5 MNRAS : Nov. 1924 : LXXXV : pp. 98-100.

THE VARIABLE STARS

The scarcity of variable stars proves to be an attraction to a serious astronomer, particularly so for the conspicuous ones are already well-known and it often comes as a reward for diligence in an observer to be successful in identifying a new one. It also excites interest, as indeed was the case with Espin when a schoolboy at Haileybury in 1876.

In an earlier chapter dealing with his adolescence it was described how Espin at the age of seventeen made his first press contribution, using on that occasion the initials T.E.E. The letter which he wrote was in respect of θ Orionis whose components were known to be variable, and Espin at the time had the good fortune to observe the fifth star which was quite often invisible with an instrument of 3-inch aperture such as he then used. So it was on the topic of variable stars that his long record of published material extending over many years began.

There do not now remain any known documents dealing with the whole of Espin's discoveries of variable stars nor have any notes or memoranda come to light which might have shown this information. Search has brought forth a number of press communications on particular items and there are lists of stars which were the joint work of Espin and others, as will be described presently. Announcements appeared from time to time in astronomical journals which were reasonably frequent from 1876 until the early years of the XIX century - the year 1902 being a terminal date. From 1902 to 1912 there is a gap during which no material on variable stars issued from Espin. Thereafter from 1912 to 1920 there were occasional - even rare -

items : the last being in the Monthly Notices of the Royal Astronomical Society in April 1920 on 'The variability of Es-Birm 120 Leporis' (1) . In the last fourteen years of his life (1920-1934) nothing whatever is found, so that the major part of Espin's variable star work thus occupied the twenty six years 1876-1902, and it will now be detailed.

Indisputable evidence shows that Espin did compile a list of variables as early as 1878, for in a letter printed in the English Mechanic on the subject of 'Variation in the colours of stars' he says .....' I have had a MS list drawn up of stars possibly variable, notices of which have been sent to me from various sources, and also of stars suspected as variable by several authors. For the use of one or two gentlemen who have already kindly offered to assist in watching them I have had copies made, and shall have great pleasure in forwarding copies to any other gentlemen who care to apply' ..... (2) No vestige of this MS survives.

A month after the above statement appeared, Espin announced (3) his work in observing star colours and the comparison of results with others obtained by fellow observers. In March 1879 he published a list of six suspected variables (4) and other letters of his in November 1881 and in April 1882 are also on stellar variation. It is, of course, to be remembered that variation may occur in respect of magnitude and of colour, either jointly or separately, so that the field open to exploration is wide.

There was a hiatus of several months between Espin's departure from Oxford in 1881 and his assignment to a curacy at

West Kirby in 1882. It is possible that preparation for the ministry would be followed in this interval, but in looking at his published material on variable stars it becomes certain that he must have made a concurrent close study of them. At the material time he was a fledgling graduate, schooled over the previous three years in theology, into which study deductive logic had been introduced in the XIII century and where it still reposed. Espin sought to classify - and so to clarify - all known facts relating to variables up to the year 1881, and he did so in a series of three articles from September 1881 to June 1883. (5)

This enterprise was analytical in the main, assisted as need arose by observational support, and his examination of data sheds some light on the utility of his Oxford background. His methods and results are consequently outlined, starting with the first article in September 1881.

The variables were numerically few compared with other stellar objects. The more prominent ones and their periods being known, Espin first constructed a chart of the entire heavens on which he indicated all these objects, and from the completed diagram he began to assess significant features. To digress for a moment, he said that his chart was ..... ' on an equal surface projection' ..... by which it is presumed that he meant a homolographic or equal-area projection such as a Mollweide or a Lambert.

His findings were eight in all and can be stated concisely :- Variable stars occupied a zone inclined at an angle of between 15° and 20° to the equator which split into two

streams, and most of the temporary stars lay in the stellar region where this zone and the galaxy both divided. Exceptions were the bright and short period variables. No theory of variables up to 1881 had explained more than a few examples, leaving the temporaries in an unique class. The 'companion star', 'dark spots', and 'dust ring' theories were instanced and in addition Espin ruminated on the true causes.

He had, thus far, procured all relevant facts, inter-related them, made his deductions, noted exceptions, and reviewed existing theories. In effect his groundwork was completed and he could next proceed to the formulation of justifiable comprehensive statements.

Six months later - in March 1882 - Espin's further work was described in the second article. He began with a discussion of the exceptions (i.e. the bright and short period variables) and advanced three conclusions :-

(1) There are no stars with periods of between 71 and 135 days.
(2) No such gap occurs elswhere nor is there any sign of such.
(3) The number of stars decreases rapidly on one side of the gap and increases on the other side of the gap.

Next followed an analytical table and the evidence of Chandler's investigations into the colours of variable stars : all of which led him to name Class I as distinctive of stars with periods of less than 71 days, and Class II as including those with periods in excess of 135 days. Chandler's results further enabled him to say that white and yellow stars taken together are about the same in number as the red and reddish ones in Class I, whilst the red group greatly exceeds the white group in Class II.

He then concerned himself with Class I. In it the brighter stars were to be found and increase of variation corresponded with increase of periodic time. In sum, for Class I stars, when light variations were small so were the periods, and the brighter the star the shorter the period. Finally in this article, and whilst conceding difficulties in so doing, he went so far as to favour the 'dark companion' explanation of variables.

Matters were now at the stage when Espin, by drawing upon his authenticated sources had stated main arguments and hence produced a reasoned classification of the components of his subject : Class I of which was then discussed.

The third and final article of June 1883 took up the features of Class II stars, which had periodicities of between 135 and 570 days and magnitude limits of 1·0 and 9·0 , In two tables he showed that the bulk of the variables have (a) periodic times of between 220 and 420 days, and (b) magnitude changes from 4·0 to 6·0 . An interesting - if oddly worded - conclusion was that average variation was similar for all periods, and conversely that average periods were the same for all magnitude variations. There were a few exceptions.

In the twenty one months which had elapsed between the first and last articles, Espin's prosecution of his task had made it apparent that another group - Class III - was needed. This arose because of his observations of 63 Cygni and other stars which displayed small variations over prolonged periods. These objects differed so greatly from those in the first two classes that their separate identity had to be clearly distinguished.

A remaining step was to add Class IV to include the temporary stars.

The last phase of this investigation, therefore, covered his comments on Class II, the addition of Class III to accommodate stars on which new data had been accumulated in the course of his general progress, and the provision of Class IV for the temporaries.

All was accomplished in his twenty third and twenty fourth years and it may well be accounted creditable. Four lines only will suffice in which to concentrate the outcome of this labour on the classification of variable stars. The results, in his actual words, were :-

Class I	With short period and small variation.
Class II	Long period and great variation.
Class III	Period of several years and small variation.
Class IV	Temporary stars.

Espin and W.H. St. Quintin Gage were two of the earliest members of the Liverpool Astronomical Society and together with Mr. T. Read the trio essayed a catalogue of all the variable stars then known (1882). (6) An allusion to this has been made already in the remarks on that Society given elswhere, but in this context it is relevant to include their joint work in more detail for it is complementary with the variable star classification due to Espin, just related.

The date was the 7th July 1882 and the place the columns of the English Mechanic. Let the authors speak for themselves. ..... 'We have collected from various sources a catalogue of all the stars suspected of variation, the number of which has now reached to between four and five hundred. The variation of so many of

them may be watched with an opera-glass, that we think, perhaps, by publication of them, some of your readers may be induced to undertake observations of them. We shall give them in order of the constellations, arranged alphabetically' .....

There then followed the first list of 48 variables, each one bearing the name of its discoverer and its stellar co-ordinates. The constellations appeared in order i.e. Andromeda, Aquarius, Aquila, ... etc. with each one showing the variables to be found within its confines. In the succeeding weeks. without a break, further lists appeared : the second one embraced stars Nos. 49 to 96, followed by Nos. 97 to 146, and so on until in the seventh and final list Nos. 303 to 343 appeared.

Of these variables only six were Espin's personal discoveries and another six were attributed jointly to Espin and another observer, the latter including Secchi, Lalande, and Struve, amongst others. The initial forecast of a catalogue of between four and five hundred stars was obviously pitched too high, for the last entry - star No. 343 in Vulpecula - fell well short of the estimate. Evenso compilation had been systematic and its presentation was a model of brevity and clear expression, but one flaw was present in the guise of omissions. Rather more than six months later - in March 1883 - Espin, writing alone, gave an addendum of seventeen more variables (Nos. 344 to 360). (7)

In retrospect it can be realised that these additions to the list would be made whilst Espin had in hand the preparation of his third article on the classification of variable stars (q.v.).

In following one line of study he evidently uncovered items pertinent to another.

The time and energy devoted to variable stars during 1883 was considerable. In the Spring Espin's variable star work, then proceeding at a lively pace, was hampered somewhat for lack of a photometer with which to measure accurately the light from the stars. Pickering at Harvard with much wealth to aid him, had produced a photometer : so too, in a more modest way, Pritchard at Oxford devised a wedge photometer based on the work of Dawes. Espin, with rather more aptitude than wealth, saw in both instruments two impediments : first they were too costly, and next they required an equatorial and clockwork motion.

Necessity as the mother of invention prompted him to make one of his own. An account of it will be given in the chapter concerned with instruments, but here it may be said that by improvising with pulp, paper, and glue, amongst other homely items, he achieved his end, and - again to quote - he said 'The results with this photometer have exceeded all expectations' . Its accuracy, judged by comparison stars, was well within 0·1 of a magnitude. (8)

The photometer was put to regular use forthwith, first by comparing its performance with that of a pair of opera glasses in the observation of U Monocerotis and LL 14551 between January and April 1883 (9) . In a paper entitled 'On a New Theory of the Cause of Stellar Variation' read before the Liverpool Astronomical Society on 21st January 1884, and to which cursory reference has been made previously, Espin spoke of his new method for determining whether or not a variable star was a binary.

The known variable 37 Pegasi was cited. Espin's notion was that its variation in light might arise from the widening and narrowing of the gap between the two component stars in the system, and which his photometer was sufficiently sensitive to detect without recourse to direct observation.

The reasoning embodied in this paper does not appear to be altogether acceptable. He seems to have presupposed the required result and then shown how his own instrument aided that conclusion. A press report is all that now remains as a record of this particular item (10), and, as printed, it must surely be unrepresentative of Espin's lecture : one cannot readily visualise his use of specious argument. Had he, moreover proceeded with his chosen task using a spectrometer a more valid conclusion would have been possible.

The subject of light in general and more particularly the intensity, and changes in intensity, of starlight came under close attention by Espin in the autumn of 1883. Magnitude estimation was possible in one of three ways i.e. by the naked eye with or without a telescope, by use of the photometer, or by a photographic plate. Following upon his appraisal of the merits of the photometer he turned next to the use of the photographic plate, appreciating as he did so that the image produced upon it was, to use Herschel's own word, due to the rays which produce chemical changes i.e. the 'actinic' light.

Results of his investigations were, as usual, contained in a paper styled 'Further Attempts at Obtaining the Actinic Light of the Stars by Means of Photography, at the Society's Observatory' (meaning the West Kirby Observatory) (11) ; and in

it he detailed how magnitude determinations as made by the eye, differed in various ways according to the object viewed, from those found by use of a photographic plate. There were, manifestly, three possible variants, namely, stars whose chemical light was in excess of that apparent to the eye, stars where it was equal, and stars where it was inferior.

We know at this much later date that the effect upon a photographic plate of ultra violet radiation extending over the range 2,000 A.U. to 4,000 A.U. would have made a significant impression on the Wratten and Wainwright plates which Espin customarily used, and after the lapse of ninety years the variations of sensitivity of the eye to radiation in the visible range from just over 4,000 A.U. to almost 7,500 A.U. are much better comprehended.

Even so, Espin informed himself of these factors, and of the effect of the infra red rays, when carrying out the work just described. He made all this very plain in the article which he contributed to the Journal of Science in 1884. (12)

The quest he made to assess actinic starlight - in furtherance of the efforts of Professor Pickering at the Harvard College Observatory - by photographic examinations of α Lyrae, α Cygni, and the Pleiades, make this quite evident. He appreciated from the first the influence of plate sensitivity and duration of exposure in revealing stellar detail, and the advantages of uniformity in magnitude estimations derived from photographic plates. Not least, of course, was the great benefit of plate storage and thereby the establishment of a permanent record and reference system for magnitudes.

Espin it may be seen was well to the fore in the stellar photography of his day, and perhaps at this point some brief comment aside from the main theme may be permitted. Had he been fortunate enough to possess the later knowledge of the origins of ultra violet and infra red radiation then temperature estimations would have been well within his grasp. In like manner, had his spectroscopic equipment been such as to enable him to detect and appreciate spectral shift : for Doppler's Principle had been stated as far back as 1842 : then stellar velocities of approach and of recession would have been only a step away. But the hindsight of the present, regretfully, cannot be translated into foresight of the past.

In order that the search for variable stars could be carried out with thoroughness over as wide a span of the heavens as possible, Espin, as Special Observer to the Liverpool Astronomical Society for the 1883–1884 session, made an appeal (at the suggestion of Mr. W.S. Franks) for co-operation from amateur astronomers generally and in this he was rewarded with ten volunteers. The sky was divided up into ten overlapping zones extending from -30° to +90°, to each one of which an observer was assigned. Ingenuity was practised by ensuring that the more important zones were given to persons spaced well apart so that poor observational conditions when prevalent at one place would usually be absent at the other. (13)

Each participant was provided with data on comparison stars suited to his zone, and in some cases outline maps were supplied to aid identification of these reference objects. From such competence dependable results were to be expected.

In the event no specific references have been found relating to researches by these variable star observers but there do appear a number of announcements on variables over the succeeding years from Espin himself, a selection of which will follow. However when account is taken of the very free interchange of information and mutual help which existed amongst amateur and professional astronomers it is quite feasible that Espin as Special Observer of the Society would serve as a reservoir for such data as were collected from all ten zones, and with this information he would be well placed to publish items of particular moment as they appeared.

For hisown part Espin pressed on with his stellar camera. On 24th May 1884 he completed a 'Catalogue of the Magnitudes of 500 Stars in Auriga, Gemini, and Leo Minor' all of which had been determined photographically. Later in the year this was published in Liverpool and a photocopy is in the dossier. In June 1885 he announced four suspected variable stars (14), and in the following November published a note on the suspected variable star in Corona Borealis which had been observed by Chalmers (15). The last-named came from Espin's new address at High Street, Wolsingham, in County Durham, to which he moved in 1885.

The change of domicile from suburban Wirral to rural Weardale and his relatively leisured life from then on, spurred Espin's concentration on every type of star. He was now twenty seven years old and a measure of maturity had supplanted the juvenile efforts of his teens. There was fixedness of purpose and self-discipline, as the record of his subsequent work will show.

Perhaps the most significant development, already noted elswhere, was a practice he started in 1886 of issuing circulars which, in terse language, conveyed the gist of any new discovery or notable event directly to those astronomers whom Espin believed to be interested. Half-a-dozen of these which have been traced to the year 1886 relate to variable stars. Other media, too, were used regularly to make known to a wider circle of observers the outcome of his energetic work with the newly-acquired 17·25 inch reflector.

In 1886 the German journal Astronomische Nachrichten bore a note from Espin on three new variables, and the English Mechanic five contributions on the same topic. In 1887 Astronomische Nachrichten carried five of Espin's variable star announcements and the English Mechanic three. By the end of 1887 the first eighteen circulars from Wolsingham had appeared - all in the space of as many months.

The spoken word supplemented the written. It has been remarked already that Espin gave his Presidential address to the Liverpool Astronomical Society on 11th October 1886 on the subject of 'Stellar Variation : a Chapter in the World's History'. That discourse set out his speculations at the time and will bear summary.

Espin premised that variation was a stage in the life of every star. In its early history there would be central heat and external cooler vapours, which would produce a spectrum of Type III. Now by assuming an increasing axial rotation and rise in temperature such would give rise to an irregular variable like 19 Piscium. With accelerated rotation absorption vapours would compress in volume and the star would then become a long

period variable.

He exemplified his hypothesis in the variable R. Hydrae whose period had progressively decreased from 500 days in 1785 to 461 in 1825, and 437 in 1870 - an overall reduction of 63 days. By presuming a time when by reason of increasing rate of rotation and temperature the vapour would cease to have cohesion, it would then be thrown out at random around the star and the spectrum would change from Type III to Type II. The beginning and end of the process, he acknowledged, were beyond him, and the lecture ended in conjecture on the history of the Sun, on geological strata, and on animal and vegetable life. (16)

Reflection generates the thought that Eddington, Jeans and Einstein were to follow by many a year. But let not such groping be derided in view of what is now thought to be the superior knowledge of a succeeding century. Only by trial, error, failure, re-trial, and eventual success, has Mankind emerged by imperceptible gradations from profound ignorance to commanding knowledge, and it is just as likely that more enlightened ones in future ages will look back upon our present day reasoning as archaic.

Following upon this lecture Espin issued, on 29th November 1887, his Wolsingham Observatory Circular No. 18, in which he proposed a new class of variable star, naming once again, 19 Piscium as an example. The characteristics assigned to this new category were three i.e. irregular variability, a magnitude variation of 1·5, and spectrum of Type IV. The stars in this class were typified by rapid and uncertain changes in brightness.

Work on the variable stars had, at this point, reached its culmination. From 1888 onwards the record shows an irregular decline. The Wolsingham Observatory Circulars which continued until 1902 provided brief notes on all aspects of observational work as an inspection of their contents in the dossier will confirm and these were supplemented from 1890 by the annual reports of the observatory similarly available, but the material appearing in the technical press was almost routine. Other aspects of Espin's astronomy, of course, continued quite apart from the variables i.e. on spectra, photography, and the red stars. It was beyond the capacity of any man to do all things at all times.

In 1888 the only significant published matter appeared in Astronomische Nachrichten and related to three variable stars. In 1889 two items in Nature on the variabilities of R. Andromedae and S. Cassiopeiae. During 1890 four notices in as many journals. The position had been reached when it could be said with truth that no single contfibution was of outstanding moment but taken collectively over the years their sum did much to enlarge the extent of knowledge of these objects. A collective reference is given of a choice of items which were published in the decennium 1889-1899. (17)

Nothing whatever appeared during the years 1900 and 1901, but in August and September of 1902 letters are to be found in the English Mechanic on 'The Espin-Peek Phenomenon' and whilst Espin, personally, had no direct connection with them since his work and name were invoked they will be noticed.

Espin, His Life and Work

Amongst the many amateur astronomers who took an active interest in variable stars Mr. C. Grover, Observer-in-Charge of Sir C.E. Peek's Rousdon Observatory in Devon (about three miles west of Lyme Regis) was prominent in the south-west of England. Equally so was Espin noted in the north. The work of Espin on variable stars is the subject of this section, but for comparison it can be said that in the Report of the Rousdon Observatory for 1902 it was related that a 6·4-inch Merz equatorial had been kept specifically for the observation of long-period variables and that 558 magnitude determinations had been made. (18)

At Bournbrook, near Birmingham, a Midland astronomer - Mr. D.E. Packer - residing, as it so happened, almost exactly midway between the observatories of Espin and Peek, evidently followed the information which issued from both places very closely. He noticed that many of the variable stars they observed bore resemblance to temporary stars in two respects (1) by the brightness of their spectra, particularly the lines due to hydrogen and helium, and (2) in displaying a nebulous halo most evident when they were near minima. In 1902 Packer wrote at length on his investigation and published a table (19) in which a comparison was made of Espin's observations of the bright lines just mentioned, with Peek's observations of nebulosity. He termed his findings 'The Espin-Peek Phenomenon'.

A little later he evolved another table based on the observations of bright line spectra made by Fr. Secchi at Rome during the years 1868 and 1869 in support of his argument, and added his own notes on temporary bright line spectra which he had seen

ten years earlier by use of a direct-vision prism and refractors of 4•5 inches and upwards. (20)

All this effort by Packer which bore the marks of sincere and lengthy labour, produced scarcely a ripple in the calm of 1902. He contributed his mite, which seems neither to have been accepted nor rejected, but simply passed over. That in itself was uncharitable, and for his exertions alone he deserves the mention which this account accords him.

It is now needful to move forward from 1902 to 1912 in order to resume this review of Espin's variable stars. In March and June of the latter year he made short contributions to the Monthly Notices of the Royal Astronomical Society, both of which spoke of variable stars. (21) Then, in 1914, he made an illustrated commentary in the English Mechanic on the variable Z Andromedae which had been discovered by Mrs. Fleming in 1901. (22) Nothing more appeared until December 1918 when in the Monthly Notices he published a list of eleven probable variables. (23)

There remain only three further items, and their spacing may indicate that the interest in variable stars, whilst not possibly languishing, had become an avocation. Nearly five years after the previous contribution in the English Mechanic there came on 24th January 1919, a note on a new variable observed in Lyra, and - finally - two more, both in the Monthly Notices. In May 1919 an announcement of a new variable in Ursa Major was made, and last of all, and already mentioned, was the contribution of April 1920 on 'The variability of Es-Birm 120 Leporis'.

So ends Espin's variable star record.

References :-

1 MNRAS : April 1920 : LXXX : pp. 603-604.

2 EM : 15-11-1878 : XXVIII : p. 248.

3 EM : 13-12-1878 : XXVIII : p. 345.

4 EM : 7-3-1879 : XXVIII : pp. 628-629.

5 Combined reference :-
O : Sept. 1881 : IV : pp. 250-251
O : March 1882 : V : pp. 77-79.
O : June 1883 : VI : pp. 180-182.

6 Combined reference :-
EM : 7-7-1882 : XXXV : p. 400.
EM : 14-7-1882 : XXXV : p. 427.
EM : 21-7-1882 : XXXV : p. 449.
EM : 28-7-1882 : XXXV : p. 475.
EM : 4-8-1882 : XXXV : p. 497.
EM : 11-8-1882 : XXXV : p. 520.
EM : 18-8-1882 : XXXV : p. 546.

7 EM : 9-3-1883 : XXXVII : p. 9.

8 EM : 29-6-1883 : XXXVII : p. 384.

9 MNRAS : June 1883 : XLIII : pp. 431-434.

10 EM : 1-2-1884 : XXXVIII : p. 468.

11 EM : 23-11-1883 : XXXVIII : p. 262.

12 JS : May 1884 : VI : pp. 249-252.

13 EM : 28-9-1883 : XXXVIII : p. 86.

14 EM : 12-6-1885 : XLI : p. 322.

15 MNRAS : Nov. 1885 : XLVI : p. 22.

16 EM : 22-10-1886 : XLIV : p. 169.

17 Combined reference :-
N : 5-12-1889 : 41 : p. 115.
MNRAS : Dec. 1891 : LII : pp. 103-104.
AN : 1892 : 129 : pp. 311-312.
EM : 24-8-1894 : LX : p. 14.
AJ : 1895 : I : pp. 351-352.
EM : 25-8-1899 : LXX : pp. 37-38.

18 MNRAS : Feb. 1903 : LXIII : p. 229.

References :- (concluded)

19 EM : 29-8-1902 : LXXVI : p. 61.

20 EM : 5-9-1902 : LXXVI : p. 80.

21 Combined reference :-
MNRAS : Mar. 1912 : LXXII : p. 419.
MNRAS : June 1912 : LXXII : p. 707.

22 EM : 23-10-1914 : C : pp. 279-280.

23 MNRAS : Dec. 1918 : LXXIX : pp. 150-151.

THE RED STARS

Throughout this section the description 'red' as applied to a stellar object will be taken to include 'reddish' and 'orange' tints.

Red stars were one of the earliest interests of Espin. He started observational work on them at Wallasey Rectory in December 1877 when nineteen years of age whilst living at home with his parents, and just prior to his election to a Fellowship of the Royal Astronomical Society on 11th January 1878. His initial effort was to compile data on eighteen red stars which he embodied in a letter to the press (1) . In March 1878 he wrote of coloured double stars noted at the Rectory and by September of that year had produced details of four more (2). Not one of these stars was a new discovery : at this stage Espin contented himself with the recording of observational data only.

He matriculated at Exeter College in January 1878 and his Oxford days then began, so it is understandable that his University commitments tended to reduce his published material on the red stars during the next three years. His interest in them continued as may be noted, for example, in press communications he made in January 1880 and again in September of the same year. (3) Red stars, inter alia, formed the material of these letters.

By the time he had assumed his curacy at West Kirby and with it the establishment of an observatory in Church Road under the aegis of the Liverpool Astronomical Society, he took up the examination of red stars with vigour. Between February

1885 and June 1885 he re-observed over a hundred of the red stars listed in Mr. John Birmingham's catalogue and communicated the most outstanding features of this work to the press (4). Just prior to this Espin had published, in October 1884, a list of 32 new objects which he had discovered with a 9-inch equatorial telescope (5), and his enthusiasm prompted him to re-examine most of these when he acquired the 17·25-inch Calver reflector in September 1885 upon his removal to Wolsingham (6). These were interesting re-observations for by use of a larger aperture the tints of the stars were better distinguished and this enabled his original information on them to be revised upon a more exact basis.

His new location, new instrument, and new discoveries all combined to give impetus to Espin's further searches or 'sweeps' as he was wont to call them. By March 1886 he raised his total of new red stars to 141 (7) and later, in 1887, in the 'Publications of the Liverpool Astronomical Society's Observatory - No. 1' he advanced it further to 185. Subsequently he continued the sequence from No. 186 onwards in successive contributions to Astronomische Nachrichten under the heading 'Stars with Remarkable Spectra' q.v.

There were notes of single discoveries in 1887 and in 1888 (8) and in passing it may be recalled that Espin's last paper to the Liverpool Astronomical Society, read on 1st February 1887, was on 'Unpublished Red Stars' - a sufficient indication in itself to show where his principal interest lay at that time despite somewhat indifferent health.

Concurrent with this pbservational work Espin compiled

a catalogue of 'all the stars of type IV known up to the present time' (9). This collection included the discoveries of various astronomers such as Vogel, Pechüle, Pickering, D'Arrest. and Duner, together with those of Espin himself, and it contained particulars of 113 such stars. It is relevant to recall that on the Secchi classification, Type IV embraced the red stars fainter than the sixth magnitude, so, in effect, this list brought up to date the diverse announcements on this particular type made throughout the astronomical world until 1889.

In the account of Espin's connexion with the Liverpool Astronomical Society his work in the revision of Mr. John Birmingham's catalogue 'The Red Stars' is dealt with in some detail and need not therefore be repeated here at length. The description - as there stated - was included in that text for the specific reason that Espin carried out the task as part of his duty as Special Observer of the Society at the relevant time. However, in order to render the present record of his progress in the field of red stars complete it can be mentioned that Espin read a paper on his revision of the catalogue before the Royal Irish Academy on 11th June 1888, and his new edition of 'The Red Stars' containing data on 1,472 objects was published by the Academy in 1890.

The last decade of the XIX century saw many notices of Espin's relating to red stars. Several of these refer only to a single object : examples being the star Es-Birm 710a (1891), a red Type III star (1893 and another in 1895), and a new variable star of Type IV (1894). The comment made in the preceding section on the variable stars that no single contribution was of outstanding moment, but taken collectively over the years their

sum did much to enlarge the extent of knowledge of these objects is exactly applicable in the case of the red stars. Details are to be found in a variety of places and to obviate an excess of individual references a selection is given in one note (10). The last article by Espin dealt with Type III and Type IV stars and appeared in the Astrophysical Journal (U.S.A.) in 1899.

Probably the chief exertion Espin made in this period was the publication in June 1898 in the Monthly Notices of the Royal Astronomical Society of a revised catalogue of Type IV stars (11) . It was an enlargement of his first catalogue of 1889 and gave the particulars of 237 objects.

The phase of Espin's astronomical activities concerned with red stars extended from 1877 to 1899 - a span of twenty two years. During the first eight years (1877-1885) he gained much observational experience by noting such details as he could discern in connexion with known red stars, and for the last fourteen years (1885-1899) he searched for new objects. It might well have been thought that a person with the methodical nature of Espin would have kept a running record of his discoveries and at the end of his task published the results in accordance with usual practice.

In the event nothing like this has been forthcoming : the reason for which did not emerge until a quarter of a century later. Once again, in the Monthly Notices for November 1924 when Espin was sixty six years of age, he contributed a list of new red stars noted, fortuitously, whilst searching for new double stars, such red stars being found after 1899. They number 186 all told (12). In the same issue an article, also by Espin,

on 'The Red Stars and the Draper Catalogue' (13) begins with these words 'After the conclusion of the sweeps for red stars in 1899 the results, 1885 to 1899, were formed into a MS catalogue. The late Professor F. Kruger requested the loan of it, and it was incorporated in his 'Neuer Katalog Farbiger Sterne' published as Specola Vaticana, vol. vii' . He then proceeds to reconcile his own discoveries in this MS catalogue, which numbered 3,932, with the Draper star classification.

If, now, the available figures be united, i.e. 3,932 red stars discovered in the period 1885 to 1899, and another 186 found after 1899, a total of 4,118 red stars can, on documentary evidence, be ascribed to Espin. Upon reflection it is an enduring tribute to his modesty that Espin thus allowed the record of his labours in identifying close on four thousand new red stars to pass into a foreign catalogue without any comment from him for twenty five years, and then only in these few lines of preface to an article written in his declining years.

(References follow on the next page)

References :-

1 EM : 22-2-1878 : XXVI : p. 574.

2 Combined reference :-
EM : 29-3-1878 : XXVII : p. 62.
EM : 20-9-1878 : XXVIII : p. 37.

3 Combined reference :-
EM : 23-1-1880 : XXX : p. 480.
EM : 17-9-1880 : XXXII : p. 36.

4 EM : 12-6-1885 : XLI : p. 322.

5 JLAS : Oct. 1884 : III : pp. 82-85.

6 EM : 8-1-1886 : XLII : p. 380.

7 MNRAS : March 1886 : XLVI : pp. 293-297.

8 Combined reference :-
AN : 1887 : 116 : pp. 319-320.
EM : 25-5-1888 : XLVII : p. 280.

9 MNRAS : April 1889 : XLIX : pp. 364-367.

10 Combined reference :-
O : Dec. 1890 : XIII : p. 393.
JBAA : 1890-1891 : I : p. 130.
EM : 20-2-1891 : LII : p. 546.
MNRAS : Dec. 1893 : LIV : pp. 100-102.
AN : 1895 : 137 : pp. 25-26.
N : 16-11-1898 : XLIX : p. 67.
AJ : 1899 : 10 : pp. 169-172.

11 MNRAS : June 1898 : LVIII : pp. 443-450.

12 MNRAS : Nov. 1924 : LXXXV : pp. 93-98.

13 MNRAS : Nov. 1924 : LXXXV : pp. 98-100.

STARS WITH REMARKABLE SPECTRA

This section is an extension of the previous one dealing with the red stars, and is concerned with unusual spectra displayed by stellar objects with a red or orange-red coloration. First it is necessary to look at the events which led Espin to incline towards this particular aspect of red star work.

Until 1883 Espin's astronomy had relied upon the telescope, but in that year it may be remembered he devised a photometer to enable his estimations of magnitude to be more accurate. From then onwards this instrument featured very prominently in his work. He related (1) how a few years afterwards he purchased a McLean spectroscope which, whilst excellent when used on bright stars, was of little avail with faint ones. As a consequence of his reading a report on Dr. Huggins' address to the British Association meeting at Nottingham on 24th August 1866 on 'Spectrum Analysis applied to the Heavenly Bodies' Espin constructed a spectroscope of two compound prisms placed before the eyepiece of his 17·25 inch reflector. It was a most successful contrivance and particulars of it are given in the section concerned with instruments.

His new spectroscope which could show the spectra of stars down to the ninth magnitude was first used in November 1886 and from then onwards Espin used it to examine every new red star he found (2) .

With these facts in mind a little repetition will show how matters developed. In 1884 Espin, we know, published a list of 32 red stars in Vol. III of the Journal of the Liverpool

Astronomical Society. In March 1886 in the Monthly Notices of the Royal Astronomical Society he carried the number forward from 33 to 141. Now in November 1886 his spectroscope came into use and the next list published in 1887 in the Liverpool Astronomical Society's Observatory Publication No 1 had as its heading 'Spectroscopic Observations' and gave data on the spectra of red stars Nos. 142 to 185.

The contributions prior to November 1886, therefore, contained no spectral data : those afterwards did so, and the changed practice continued in the sixteen further lists published in Astronomische Nachrichten between 1887 and 1900. The title adopted in every case in this long succession was 'Stars with Remarkable Spectra' and they numbered 1,424 altogether. A collective reference is given for all of them. (3)

The sixteen contributions just mentioned were, in general, much more formal than those devoted to the red stars - as such - and to the variable stars. Descriptive matter was far more compressed and the practice of tabulating information was always employed. An end column in the tables headed 'Remarks' included such clipped comments as were appropriate to the entries.

Whilst such method of presentation of facts is concise and uniform it is also quite colourless and lacking in personal expression. An overall feeling of regimentation is present and thereby the individuality of the compiler, in which the principal interest lies, is lost.

(References follow on the next page)

References :-

1 MM : 14-1-1887 : XLIV : pp. 430-431.

2 O : July 1887 : X : pp. 258-260.

3 Combined reference :-

Applicable in all cases :

AN - 'Stars with Remarkable Spectra'

1887	117	pp. 49-52	(Nos 186 - 223)
1888	118	pp. 257-261	(Nos 224 - 272)
1888	119	pp. 309-312	(Nos 273 - 287)
1889	121	pp. 33-36	(Nos 288 - 339)
1889	122	pp. 257-260	(Nos 340 - 386)
1890	124	pp. 177-180	(Nos 387 - 430)
1891	126	pp. 361-366	(Nos 431 - 511)
1892	129	pp. 297-302	(Nos 512 - 627)
1893	133	pp. 43-48	(Nos 628 - 736)
1894	134	pp. 123-128	(Nos 737 - 831)
1894	135	pp. 265-274	(Nos 832 - 965)
1895	137	pp. 369-376	(Nos 966 - 1,057)
1896	140	pp. 241-252	(Nos 1,058 - 1,179)
1898	145	pp. 321-326	(Nos 1,180 - 1,249)
1899	149	pp. 129-134	(Nos 1,250 - 1,329)
1900	152	pp. 135-142	(Nos 1,330 - 1,424)

THE DOUBLE STARS

Of all the systematic work undertaken by Espin during his career in astronomy his application to the measurement of double stars and to the discovery of new pairs was by far the most outstanding achievement. It is known that he devised a method for measuring the separation of two stars as early as 1877 (1) when he was nineteen years of age and he continued to contribute notes on his discoveries to the scientific press until January 1933 when he was seventy four (2) . In that space of time he discovered 2,575 new pairs. A diligent search has revealed only two persons in the history of astronomy - F.G.W. von Struve and R.G. Aitken - whose discoveries of double stars exceeded this number, and it can be affirmed with a degree of conviction, that, at the time of his death, in the field of double star identification, he ranked third in order of eminence. (see footnote)

If, for a moment, one considers the resources of the Dorpat and Poulkova observatories which were available to F.G.W. von Struve, and those of the Lick Observatory in the U.S.A. similarly at the disposal of R.G. Aitken, and compares them with the structure and equipment in the grounds of the Tow Law vicarage, then the simple statement with which the previous paragraph was concluded, sufficiently indicates how profound was the ability of their owner.

Footnote :- In 'The Binary Stars' (R.G. Aitken : 1964 edition) a table is included on p. 25 in which the double stars attributed to six leading astronomers are given. Aitken leads with 3,105 and Wilhelm Struve (meaning Friedrich Georg Wilhelm von Struve just mentioned) comes next with 2,640. Espin, therefore, is third in order with a total of 2,575 double stars to his name.

Espin, His Life and Work

Before an examination is made of this massive undertaking it may be as well to learn exactly what Espin meant by the expression 'double star' . Fortunately he voiced his opinion in 1883 (3) in these actual words ..... 'The term 'double star' is one of great latitude, and may mean any two stars lying near each other. Sub-divided into physical and optical doubles we have (1) stars of approximately the same distance revolving round their common centre of gravity ; (2) stars which lie in the same line of sight, but one an infinitely greater distance away than the other' ..... . This description of a double star can now be compared with the views of R.G. Aitken (4) who drew attention to the use of the term - in its Greek equivalent - by Ptolemy when referring to ν Sagittarii which consisted of two fifth magnitude stars separated by 14 minutes of arc. Herschel in 1802 employed the designation 'binary star' as descriptive of 'a real double star - the union of two stars, that are formed together in one system, by the laws of attraction' . Espin's sub-division (1) therefore, coincided with Herschel's 'binary star' .

As late as 1911 Espin, in writing (5) on the Potsdam 'Katalog von Doppelsternen der photographischen Himmelskarte aus der zone +31° bis +40° Deklination' which contained the measures of 1,564 double stars, commented that .....'Professor Scheiner has taken Struve's limit of 30 seconds as his standard' ..... , and he went on to tabulate 2,985 double stars within the angular limits of zero and 30 seconds of arc. In this same commentary Espin provided the informative tit-bit that 5 seconds was the limit of the Lick observers, and in their examination of all stars to magnitude 9·0 any pairs with greater distances usually

were rejected. Espin's own double stars, it is to be noted, were mostly faint and wide pairs, of a kind usually neglected by the traditional worker in the field.

Now humour, the very leaven of knowledge, was a deep-seated attribute of Espin, and amidst the towering intellects of contemporary astronomers his detached mind was apt to perceive amongst the morsels which fell from their tables, some crumbs of delicious spice. It is irresistible not to recount just one choice example. For the digression forgiveness is asked in advance.

Mr. S.W. Burnham, one of the best-known North American astronomers of his day in the field of double star observations published an article in a U.S. journal called the 'Sidereal Messenger' in 1885 on the contentious topic of 'Small v. Large Telescopes', which was later reprinted in the English Mechanic of 9th October of that year. Controversy at once arose in which Mr. George Calver and Mr. W.F. Denning took up positions antagonistic to that of Burnham. Espin joined the argument (6) by drawing upon his past experience of nearly twenty years to produce evidence also contrary to the views expressed by Burnham.

This is but a minor incident yet Espin's letter gives an insight into the causes which inclined him towards the reflector in preference to his original liking for the refractor. He also made a cogent point in his comment on the attitudes of the protagonists. Burnham, he observed, condemned large reflectors but never used one : Denning condemned large refractors but never used one. Those acutely perceptive of the Universe were obtuse to their own human frailties, and the unwitting humour of the situation was apparent to Espin at least.

Espin, His Life and Work

Espin's work on double stars may be placed into two natural divisions (1) observations carried out up to 1900, and (2) the more exact work of micrometrical measurement and discovery from 1901 until his death in 1934. The fields of activity selected by Espin, it may be remarked, were related to the devices which he improvised from time to time, and these are described in the section particularly devoted to them. In the present context the following occurrences were significant.

In 1883 his photometer was devised, and, as outlined when dealing with the variable stars, he was aided by this instrument in the measurement of magnitudes of those objects thenceforward. In 1886 he produced a home-made spectroscope which, similarly assisted in his examination of red stars and stars with remarkable spectra. During the summer of 1900 Espin constructed his illuminated micrometer (7) , and from then onwards the more or less routine observational data on double stars derived in previous years was replaced by the precise measures made possible by this new acquisition.

The earlier years - up to 1900 - will be dealt with first. With only one exception all Espin's contributions on double stars in this period were made to the English Mechanic. The odd instance was a paper which he submitted to the Astronomical and Physical Society of Toronto, and read before that body on 24th January 1893. A summary was printed later in the U.S. journal Astronomy and Astrophysics (8) with a commentary by 'S.W.B.' which obviously meant Mr. S.W. Burnham. The report of this paper bore the heading 'Micrometrical Measures of Some Double Stars With New Companions and of Five New Pairs', and it

was made quite clear in the text that the discoveries, which numbered seventeen in a tabular display, were made by Espin using his 17·25 inch reflector with a Troughton and Simms micrometer whilst carrying out a revision of some stars for a new edition of the Revd. T.W. Webb's 'Celestial Objects for Common Telescopes' .

In point of fact Espin's revision of this very well known manual appeared concurrently, the first volume of the 5th edition being published in 1893, and the second volume in 1894, but this apart, the double stars which were the subject of the paper were found by chance whilst pursuing another main purpose and Espin when referring to the micrometer in 1900 said .....'The micromater is one of Troughton and Simms, and of the old-fashioned type. There was no method of illuminating it , and so it was useless ' ..... . It can be taken, therefore, on the evidence of Espin's own words that the measures he gave in his paper were suspect, and indeed it was the shortcomings of this selfsame micrometer which led him to make his own improved version in the summer of 1900 as previously mentioned.

An early effort of Espin's - again at nineteen years of age - and noted in the section relating to the red stars, was a list of eight coloured double stars regarding which he invited comment from other astronomers as to their tints (9). These relatively easy objects were held out as a test of the observational skill - or lack of it - of those who cared to watch them. In 1880 he provided, in a similar manner, a list of various objects including several pairs, and asked for .....'further news of any of these objects ' ..... (10) , and once more, in 1881 a small collection of doubles which he had observed. (11)

In the Spring of 1882 the team of Espin, Gage, and Read, announced their projected work in astronomy (12). They hoped to survey the chief objects of interest known in the sky visible in England and also to find and publish others hitherto unknown and their first list included some double and multiple stars, but the task subsequently was more concerned with variables and is related elswhere. However, in 1883, Mr. S.W. Burnham of the Dearborn Observatory U.S.A. investigated a double star which Espin had discovered near to 16 Aurigae and which had been included in the latest edition of Webb's 'Celestial Objects for Common Telescopes' (13). Burnham went to the trouble to give measurements of the components omitted by Espin, for which purpose he employed the 18·5 inch instrument of that observatory.

Espin's Liverpool lecture of January 1883 before the Astronomical Society there on the subject of 'Some New Double Stars' (14) was more of a popular nature than otherwise. In fact, in this lecture he gave his own description of a 'double star' quoted on p. 149. Taken overall the summary of the lecture in the English Mechanic gives the impression that Espin's interest was general rather than specific. The discourse was virtually the epilogue to the first phase of his double star work for nothing further from him appeared for the next ten years, until, in 1893, he submitted his paper to the Astronomical and Physical Society of Toronto, already noticed.

Attention to double stars was much reduced at this period ; not, possibly, because interest was absent, but that pressure of work in other directions was mounting, and a further seven years elapsed before Espin wrote a short letter by way of comment on a series of articles by Mr. Norman Lattey in which

double stars had featured (15). But by now - 1900 - Espin was engaged in making his illuminated micrometer, upon the successful outcome of which he proceeded with great vigour to the second phase of his double star work : an enterprise destined to endure for the rest of his days, and such will now be considered.

The resurgence of activity in the field of double stars was very marked from 1901 onwards, prompted very naturally by the newly-gained facility of accurate measurement rendered possible by this illuminated micrometer. He followed two simultaneous lines of work which proceeded abreast for the next thirty three years without interruption, which may well have occurred during this long interim when other diversions came along from time to time.

First Espin determined to carry out a thorough search for new double stars and at the same time to make micrometrical measures. His initial contribution on both topics was to Astronomische Nachrichten in 1901 when he listed thirty nine new double stars and gave micrometrical measures of neglected doubles in the zone +30° to +60° . (16) In order to keep this list of double stars consistent with later discoveries in the same field they will be called Nos. 1 - 39.

At the outset of these prolonged tasks Espin evidently harboured some doubt as to his capacity to fulfil them satisfactorily. In September 1901 he wrote .....' I should like to make certain confessions in reference to double-star work and double-star measurements. In the first place, I do not think my sight particularly suited for this work ; in the second place, I have

to use spun glass instead of spider lines as I cannot get proper illumination. The result is that in pairs under 5 seconds the distance is always apparently over-measured' ..... (17) Ten years later - in 1911 - he said .....'the short focus of the 17·25 inch, and the great susceptibility of the reflector to disturbances, make close and unequal pairs difficult of detection' ..... (18) . It is to be remembered that most of his discoveries were wide pairs and these quotations could contain a hint as to why his preference lay in that direction : but be that as it may and with any and every fault he had taken into account, he still emerged as an outstanding observer in his chosen field of research.

From September 1901 to March 1902 Espin wrote five letters to the English Mechanic headed in all cases 'Notes on Double Stars' . These in the main were sets of directions intended to guide observers to double stars which he had kept under surveillance. The letters dealt with the multiple stars in Cygnus, doubles near to the Dumb-bell nebula, and a rich region in Camelus, to mention only the chief items, and in doing this he set a pattern he was to follow until 1927. Indeed in many of the intervening years Espin had at least one letter on double stars in the English Mechanic. During 1907 and 1908 he made similar contributions to the Journal of the Royal Astronomical Society of Canada in the form of short articles, but for brevity a collective reference to a selection of these less important items will now be included (19) .

With the passing of the years discoveries of double stars mounted as will be detailed presently, but before giving the documentary evidence of this it is apposite to mention some

of the informative casual remarks which Espin made occasionally in his extensive published material . These are a few examples. In 1907 : 'I have lately completed the extension of my MS catalogue of known double stars through 5 degrees viz. from +25° to +30° . It contains 874 known double stars'.
In 1908 : 'On Feb. 26 I detected and measured the six-hundredth pair found with the 17•25 inch' .
In 1911 : (in reflective mood) 'In the autumn of 1899 it was determined to use the 17•25 inch reflector for the measurement of neglected double stars, and the search for new pairs' , and
In 1923 (when he was sixty five years of age) 'It was, I think, in 1905 that I believe I became dissatisfied with mere sweeping for new pairs, and determined to settle down to a systematic examination of every star in Argelander' .

The first contribution by Espin, in 1901, on the subjects of double stars and micrometrical measures was to Astronomische Nachrichten already mentioned and included stars Nos. 1 to 39. In 1902 he sent to the same journal another list of seventy three new double stars numbered 40 to 112 (20). The heading on the contribution was 'List of seventy two new double stars' so for once, at least, he made a slight error in his arithmetic. Even the Gods can nod.

The third and all subsequent communications by Espin on both subjects were made to the Monthly Notices of the Royal Astronomical Society. The May 1902 issue contained a list of seventy eight double stars of the Mensurae Micrometricae which he had measured, and this - although not so described by Espin - was the first of twenty four series of micrometrical measures, and

he accompanied it on this particular occasion with a supplementary list of sixty various doubles. It can be noted at this point that Espin's practice was only to number his double star discoveries, and not his micrometrical measures.

The amount of detail involved in the published material is so great that it has been thought appropriate to make classified abstracts and such are appended to this section. There are three exceptional items on which short notes are desirable, and these are as follows :-

In January 1904 Espin published a list of fifteen new double stars in the Monthly Notices which had been found to be double during the year 1903. Because they were few and with incomplete measures Espin did not number them and consequently they do not appear in the total of 2,575 double stars already attributed to him. Next, up to 1916, in the course of systematic examination of stars in the Bonner Durchmusterung for new pairs, a number were found which were so faint that it seemed improbable that Argelander could have seen them had they not been brighter in his day. Others were missing altogether. Espin collected the whole into a list of eighty one items which appeared in the Monthly Notices for November 1916. Finally, in 1925, Espin and Mr. M.A. Ellison of the Armagh Observatory collaborated in identifying and measuring forty one double stars first noted by Mr. Edwin Holmes in 1901-1902, and their observations were printed in the Monthly Notices for December 1925. None of these were counted in Espin's total.

In closing this section on the double stars the watchful eye of Doolittle merits a parting acknowledgment.

Professor Eric Doolittle of the Flower Observatory U.S.A. examined Espin's regular contributions to the Monthly Notices very closely indeed during the latter part of the First World War (1914–1918) and beyond it. In the three years 1917, 1918, and 1919, Doolittle followed up these lists by brief articles on errata which he had found in them. Such fault-finding exercises might have been expected to have irritated Espin even supposing they were in good faith. Mr. Milburn who was assistant to Espin at the material times negatives this absolutely. It seems that, as so often occurs, tolerance dissolved pique. The name Doolittle so belied its owner that he was - privily - known as Doo-a-lot, and consequently his efforts as a perfectionist were benighly received.

(References follow on the next page)

References :-

1 EM : 28-9-1877 : XXVI : p. 68.

2 MNRAS : Jan. 1933 : 93 : pp. 192-194.

3 EM : 26-1-1883 : XXXVI : p. 471.

4 BS : p. ix.

5 EM : 25-8-1911 : XCIV : pp. 89-90.

6 EM : 23-10-1885 : XLII : pp. 164-165.

7 EM : 17-8-1890 : LXXII : p. 10.

8 AA : 1893 : 12 : pp. 282-283.

9 EM : 29-3-1878 : XXVII : p. 62.

10 EM : 9-4-1880 : XXXI : p. 110.

11 EM : 27-5-1881 : XXXIII : p. 281.

12 EM : 21-4-1882 : XXXV : pp. 150-151.

13 EM : 19-1-1883 : XXXVI : p. 448.

14 EM : 26-1-1883 : XXXVI : p. 471.

15 EM : 11-5-1900 : LXXI : p. 270.

16 AN : 1901 : 155 : pp. 321-334.

17 EM : 27-9-1901 : LXXIV : p. 154.

18 EM : 11-8-1911 : XCIV : p. 42.

19 Combined reference :-
EM : 29-11-1901 : LXXIV : p. 338.
EM : 20-10-1905 : LXXXII : pp. 252-253.
JRASC : 1907 : I : pp. 186-187.
JRASC : 1908 : II : pp. 279-281.
EM : 14-10-1910 : XCII : p. 250.
EM : 6-10-1916 : CIV : p. 208.
EM : 23-9-1921 : CXIV : p. 112.
EM : 10-4-1925 : CXXI : p. 190.
EM : 11-2-1927 : I (new series) : p. 278.

20 AN : 1902 : 158 : pp. 241-246.

ABSTRACT OF PUBLISHED MATERIAL BY THE REVD. T.H.E.C. ESPIN

RELATING TO NEW DOUBLE STARS

Items are in this sequence :-

Year : date : volume : page : numbers of stars discovered.

In Astronomische Nachrichten :-

Year	date	volume	page	numbers of stars discovered.
1901	155		321-326	1 - 39
1902	158		241-247	40 - 112

In the Monthly Notices of the Royal Astronomical Society:-

Year	date	volume	page	numbers of stars discovered.
1903	Jan	LXXIII	172-173	113 - 150
1905	May	LXV	710-713	151 - 221
1906	Jan	LXVI	145-147	222 - 269
1906	May	LXVI	430-431	270 - 311
1907	Jan	LXVII	194-196	312 - 403
1907	May	LXVII	495-496	404 - 442
1908	Jan	LXVIII	206-209	443 - 551
1908	May	LXVIII	523-524	552 - 609
1909	Jan	LXIX	223-225	610 - 704
1909	May	LXIX	604-605	705 - 743
1910	Jan	LXX	240-245	744 - 864
1910	May	LXX	541-543	865 - 927
1911	Jan	LXXI	219-223	928 - 1,051
1912	Jan	LXXII	193-195	1,052 - 1,125
1913	Jan	LXXIII	162-163	1,126 - 1,191
1914	Jan	LXXIV	247-250	1,192 - 1,293
1915	Jan	LXXV	203-205	1,294 - 1,356
1915	May	LXXV	555-556	1,357 - 1,405
1916	Jan	LXXVI	210-212	1,406 - 1,479
1917	Jan	LXXVII	239-242	1,480 - 1,600
1918	Jan	LXXVIII	192-195	1,601 - 1,705
1919	Jan	LXXIX	212-214	1,706 - 1,768
1920	Jan	LXXX	331-332	1,769 - 1,805
1921	Jan	LXXXI	233-235	1,806 - 1,864
1922	Jan	LXXXII	188-190	1,865 - 1,933
1923	Jan	LXXXIII	156-159	1,934 - 2,006
1924	Jan	LXXXIV	165-167	2,007 - 2,078
1925	Jan	LXXXV	278-279	2,079 - 2,137
1926	Jan	LXXXVI	132-134	2,138 - 2,209
1927	Jan	LXXXVII	220-222	2,210 - 2,273
1928	Jan	LXXXVIII	185-187	2,274 - 2,328
1929	Jan	LXXXIX	268-269	2,329 - 2,362
1930	Jan	XC	319-320	2,363 - 2,400
1931	Jan	XCI	294-295	2,401 - 2,444
1932	Jan	92	216-218	2,445 - 2,543.
1933	Jan	93	193-194	2,544 - 2,575.

ABSTRACT OF PUBLISHED MATERIAL BY THE REVD. T.H.E.C. ESPIN

RELATING TO THE MICROMETRICAL MEASURES OF DOUBLE STARS

Items are in this sequence :-

Year : date : volume : page.

In Astronomische Nachrichten :-

1901	: 155	: 327-334			

In the Monthly Notices of the Royal Astronomical Society :-

1902	: May	: LXII	: 528-533	: 1st series		
1904	: May	: LXIV	: 675-680	: 2nd ..		
1906	: Jan	: LXVI	: 141-145	: 3rd ..		
1907	: Jan	: LXVII	: 190-193	: 4th ..		
1908	: Jan	: LXVIII	: 202-205	: 5th ..		
1909	: Jan	: LXIX	: 218-220	: 6th ..		
1910	: Jan	: LXX	: 237-238	: 7th ..		
1911	: Jan	: LXXI	: 217-219	: 8th ..		
1912	: Jan	: LXXII	: 191-192	: 9th ..		
1914	: Jan	: LXXIV	: 244-247	: 10th ..		
1917	: Jan	: LXXVII	: 236-239	: 11th ..		
1918	: Jan	: LXXVIII	: 189-192	: 12th ..		
1919	: Jan	: LXXIX	: 211-212	: 13th ..		
1920	: Jan	: LXXX	: 329-330	: 14th ..	(E+M)	
1921	: Jan	: LXXXI	: 232-233	: 15th ..		
1922	: Jan	: LXXXII	: 187-188	: 16th ..		
1923	: Jan	: LXXXIII	: 154-156	: 17th ..	(E+M)	
1924	: Jan	: LXXXIV	: 162-164	: 18th ..	(E+M)	
1925	: Jan	: LXXXV	: 276-278	: 19th ..	(E+M)	
1926	: Jan	: LXXXVI	: 131-132	: 20th ..	(E+M)	
1927	: Jan	: LXXXVII	: 215-220	: 21st ..	(E+M)	
1930	: Jan	: XC	: 317-319	: 22nd ..	(E+M)	
1932	: Jan	: 92	: 214-215	: 23rd ..	(E+M)	
1933	: Jan	: 93	: 192-193	: 24th ..	(E+M)	

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Note :

Measurements contained in the 1920 list were made by Espin and Milburn. So too were those for the years 1923 to 1933 both inclusive. Such are shown by the letters (E+M) appropriately placed.

THE DISCOVERY OF NOVA LACERTAE

Just after 5·00 pm on the evening of 30th December 1910 whilst Espin was observing stars in the zones +51° and +52° he saw what he believed to be a red star 0m. 7s·5 following B.D. +51° 3420 and about 2' south of it. He estimated the magnitude, as seen in twilight, at 8·0 and it was not to be found in the charts of Argelander. Forthwith he went to the vicarage and brought out his spectroscope, which consisted of a Hilger direct-vision compound prism of Jena glass mounted in front of a positive eyepiece of magnification 200. With this in use a discontinuous spectrum was revealed with a bright line (thought to be F) and another near to the yellow D line. There were other lines and flutings. (1) It was obviously no ordinary star and the records of variable stars which Espin consulted contained no note of it.

His interest was very much aroused. By 5·30 pm he had sent off a telegram to Greenwich Observatory where the object was found, and from there a cable was dispatched to Harvard College Observatory in the U.S.A. At Harvard it was photographed that same night, and since the practice there was to photograph the entire sky on every clear night, earlier plates were examined (2) . From these it was found that the object was absent on 19th November but present on the 23rd November and again on the 7th December, 1910. The images indicated that it must have been visible to the naked eye for its magnitude was estimated at 5·0, and it was most remarkable that it had not been discovered in the three weeks prior to Espin's observation on 30th December 1910. During the

second week of January 1911 Espin heard from the Astronomer Royal that his discovery was an original one, and that the object would be known as Nova Lacertae.

The foregoing is a condensed account of events relating to Espin at the time, but inevitably the appetite of the popular press had been whetted and once on the scent it poured forth florid accounts of the new nova which the Vicar of Tow Law had observed. The more dignified versions appeared in The Times and in the Manchester Guardian : the rather sensational ones in local newspapers. Little of this had any scientific worth and it is only mentioned as an indication of the impact of this example of Espin's stellar exploration. Interest, indeed, extended abroad, and in the dossier will be found both a copy and a translation of French comment : throughout 1911 the German journal Astronomische Nachrichten carried several articles on the nova in French, German, Italian, and English, so widespread was the attention it commanded.

Nearer home not only the lay press provided news on the new object : in far more serious vein the scientific journals were equally accommodating. The Monthly Notices for January 1911 had articles by Hinks of the Cambridge Observatory and another - much longer - by Bellamy of the University Observatory at Oxford (3). One cannot but remark on the very evident pride of Bellamy when writing on Espin whom he was careful to refer to as .....'the Revd. T.E.Espin M.A., of Exeter College, Oxford' ..... . Tribute indeed to an alumnus of almost thirty years standing.

The disparity which existed between the Bishop of Durham

who ranked fourth in the English Hierarchy and the perpetual curate of one of his rural parishes was – to say the very least – considerable, and acutely so when that parish was Tow Law and that curate a whimsical one in church discipline generally. The celestial outburst manifested in Nova Lacertae bridged that gap wonderfully. Dr. Handley Carr Glyn Moule, who held the episcopal See of Durham from 1901 to 1920 and who at heart must have had a sincere regard for Espin wrote him a highly complimentary letter on 6th January 1911 in his own hand, and a copy is included in the dossier.

Many more acknowledgments were paid to Espin. Dyson at Greenwich, Newall at Cambridge, Pickering at Harvard, and Max Wolf at Heidelberg, are instances. Espin, in point of fact was in correspondence with Wolf on Nova Lacertae. For three consecutive weeks in January 1911 Espin's nova had a place in 'Our Astronomical Column' which at the time was a regular feature in Nature, and the more mundane English Mechanic had altogether nine contributions about it between January and September 1911. The last item was a most interesting letter from Espin (4) in which he gave sketches of the field of the nova and data relating to it which had been gathered from various sources. The most concise and readable account of the discovery and its implications – as understood in 1911 – is that due to M. Émile Touchet of Paris. q.v.

The stimulus induced by Espin's observation on the evening of 30th December 1910 declined during the following months and by the end of 1911 the event had passed into astronomical history. There remained, however, one important

honour which was to be bestowed upon him early in 1913 as a consequence of his discovery and this will now be related.

The distinction in question was the conferment upon Espin by the President of the Royal Astronomical Society of the Jackson-Gwilt Medal and Gift. The official announcement in the Monthly Notices for February 1913 was in these words .....'The Council have awarded the Jackson-Gwilt Medal and Gift to the Revd. T.H.E.C. Espin for his observations of the Spectra of Stars and his discovery of Nova Lacertae' ..... . At the presentation ceremony the President briefly outlined the astronomical work carried out by Espin from 1878 until 1910.

The medal which Espin received on that occasion is still in the possession of Mr. William Milburn, his former assistant. It is three inches in diameter and made of bronze. On the obverse is a portrait of Sir William Herschel and on the reverse Urania holding an armillary sphere. Full sized colour photographs depicting each side of this medal are in the dossier.

Although the crescendo of attention which focussed on the discovery of Nova Lacertae was relatively short-lived, there endured permanent recognition of Espin as an astronomer of note. He had made an important original contribution to knowledge, and this caused the event to be regarded as his greatest single achievement. His work on variable stars, red stars, and double stars, was lengthy in every case but in this present instance the few brief moments of observation in the evening of 30th December 1910 sufficed to bring lasting renown.

With the passing of the years Nova Lacertae (1910)

as it came to be designated in retrospect, relapsed to the 13th or 14th magnitude. In a contribution to the Monthly Notices in June 1935 by W.H. Steavenson on 'Observations of Novae 1934–1935' he referred to it specifically as an object of magnitude 14·4, and added a comment that ....'There has been no sensible change in the light of this object for many years past' ..... . It had sunk back into that oblivion whence it arose.

References :-

1 MNRAS : Jan. 1911 : LXXI : pp. 189–190.

2 MNAS : 13-1-1911.

3 MNRAS : Jan. 1911 : LXXI : pp. 191–207.

4 EM : 8-9-1911 : XCIV : p. 141.

CHAPTER IX

EARLY EQUIPMENT, ASTRONOMICAL INSTRUMENTS, AND ESPIN'S OWN DEVICES

The measurement of telescopic objects was a task which progressed as a result of experience combined with improvements in equipment. Espin's early observations when he was at Haileybury (1872–1876) were based purely on optical estimations. His only instruments whilst at school were a pair of opera glasses, a 1-inch Dollond telescope, and a 3-inch achromatic refractor made by Large. In the autumn of 1876 one of his father's churchwardens at Wallasey (Mr. Harrison, head of the Harrison steamship line) presented Espin junior with a 5-inch Tully refractor fitted with a 1-inch finder, so that until he entered Exeter College at Oxford in January 1878 he would have this larger telescope at his disposal and it would be available to him at the Wallasey Rectory during University vacations. This splendid gift was but the first of a long line of benefits bestowed upon Espin the younger in both cash and kind during his astronomical career.

At Oxford Espin used the 3-inch refractor already mentioned, and by leave of Professor Charles Pritchard he had access to the 13-inch de la Rue reflector at the University Observatory. In December 1878 Espin spoke, also, of his use of a 5-inch Wray achromatic.

It will serve so much the better to colour the picture of those early years if a summary is now made of his initial [illegible] when an interest in astronomy

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It will serve so much the better to colour the picture of those early years if a summary is now made of his initial equipment - other than instruments - when an interest in astronomy first began. Light on the matter is cast by three letters

which he wrote to the press in 1878. With the full maturity of his twenty years on which to make a stance, he indulged in reminiscence.

He had obtained a Malby planisphere. There were, in fact, two models available in the 1870's, one of ten inches diameter costing 5/6d. and another of seventeen inches costing 10/6d. Espin had the larger which gave R.A. and declination measures for each star depicted. He had also a copy of Mr. R.A. Proctor's publication 'A New Star Atlas' which he must have used assiduously for, it is interesting to see, the 19th edition of that work which appeared seventeen years later, in 1895, was one which had been 'revised and corrected by T.E. Espin' . It is inferred from statements made by Espin that he also possessed a copy of the Revd. T.W. Webb's 'Celestial Objects for Common Telescopes' . Such is virtually certain for he was responsible for the revised and enlarged 5th edition of Webb's renowned guide, volume I of which appeared in 1893, and volume II in 1894. As late as 1917 Espin's 'thoroughly revised' 6th edition, in two volumes, was published.

Two further items made up his prime stock. He acquired a copy of Mr. John Birmingham's 'Catalogue of Red Stars' and one may recall that Espin's revised edition thereof was printed in the Cunningham Memoirs of the Royal Irish Academy in 1890. The remaining book was Mr. J.E. Gore's 'Southern Stellar Objects' . The last-named is ascribed to Espin by reason of his facile allusion to its contents.

It is an impressive record to see that three of Espin's original books on astronomy, years afterwards, re-appeared in

the form of editions which he edited : evidence in itself of sustained use. With this summary of early equipment completed a return is now made to the principal theme.

Until this time (1878) no reference can be found as to the degree of accuracy available to Espin for measurement purposes, as for instance in the graduations of the R.A. and declination circles of his telescopes. Indeed in January 1879 he wrote of star magnitudes derived with an opera glass and compared these with corresponding determinations made earlier by Heis and Herschel. Such appraisals continued until the appearance of his photometer in 1883 when that instrument supplanted the former means.

During the next year, 1884, Espin began to use a 4·5-inch aperture stellar camera made by Grubb, so bringing comparative stellar photography within his ambit. He used the camera in compiling his 'Catalogue of the magnitudes of 500 Stars' mentioned elswhere which was published at Liverpool in the same year.

At this point Espin was twenty seven years of age : the quality and variety of his apparatus was improving markedly over the comparatively modest means of earlier days, and this trend continued strongly. In 1885 Mr. George Calver, a leading speculum maker in his day, lent a 9-inch reflector to the Liverpool Astronomical Society which Espin used, and Calver further supplied a 17·25-inch Newtonian with a driving-clock for Espin's new observatory at Wolsingham. Hitherto it may be appreciated Espin had relied largely on qualitative judgment but now he could proceed using a superior instrument of large aperture with the considerable asset of tolerably precise

measurement, for the 17·25-inch had circles which enabled R.A. to be read to 5 seconds of time and declination to 1 minute of arc.

A McLean star spectroscope was next obtained for the examination of red stars but its inadequacy when used on faint objects led Espin to evolve his own spectroscope in 1886. Canon Slatter presented a 4·5-inch equatorial refractor with a driving clock, circles, and micrometer by Troughton and Simms, to the Wolsingham Observatory concurrently, and in 1890 resources were expanded by the additions of an astronomical clock given by his mother, meteorological instruments donated by Miss Brook, one hundred pounds sent by the Revd. T.W. Webb (equivalent 1972 value = L.657) towards Espin's new observatory at Tow Law, and thirty five pounds (equivalent 1972 value = L.230) offered to him as a testimonial from the parishioners of West Kirby. Fortune was indeed smiling, and she so continued.

Miss Compton - Espin's godmother - died in 1892 and left him a legacy with which he purchased a photographic telescope of 8-inches aperture. Miss Brook gave him a hygroscope and a solar radiation thermometer. From September to December 1892 Espin used his Troughton and Simms micrometer in making measures of double stars, and, of course, from this he made his own illuminated micrometer in 1900. It is apparent that by the turn of the century, when Espin was 42 years old, he had assembled a range of very useful apparatus, which met his needs for the next seven years.

In an article which Espin contributed to the Journal of the Royal Astronomical Society of Canada in 1907 (1) he

described at length an adapter carrying a Ramsden eyepiece with a Barlow lens whose magnification could be varied at will by moving a draw-tube. With this was an illuminated micrometer which evidently superseded his own invention of 1900. He had obtained this instrument at fourth hand for he related how it had been made for Lord Lindsay from whom it passed to Dr. Copeland (of Dun Echt Observatory) and thence to Mr. Isaac Ward of Belfast. Espin obtained it from Ward, whom he knew very well indeed. The constructional features are clearly described in the reference, and in particular it may be noted that one revolution of the micrometer screw was equivalent to 5 seconds - a refinement very welcome compared with earlier equipment.

During the autumn of 1914 Mr. George Calver supplied a 24-inch Newtonian reflector to the observatory at Tow Law. This was Espin's most ambitious telescope, and being furnished with a new driving clock it was used to measure double stars found with the 17•25-inch reflector from which, at that time, the drive had been removed. That facility was not restored to it until 1922 when Mr. A.J. Pullon supplied one and so enabled measurements to be made with both telescopes : the interim being taken up with improvisation.

There were other acquisitions. A 5-inch refractor by Troughton and Simms in 1914, a photographic star detector made by Whittle of Liverpool in 1920, and two telescopes of 9-inch and 9•5-inch apertures which were mounted in 1924. An informative list of equipment actually in use on 11th March 1921 may be seen in the accompanying copy of the Wolsingham Observatory Visitors Book.

The most important instruments which Espin made himself and mentioned in the previous paragraphs will shortly be considered in some detail, but taking the whole in broad review it seems that until 1883 qualitative estimations were the order of the day : from 1883 until 1907 equipment capable of accurate measurement was added, to which the 24-inch reflector of 1914, and the driving-clock for the 17·25-inch in 1922, were significant later additions during the last twenty years of Espin's life.

Perhaps it is apt to say that Espin never employed mathematics of an advanced nature and never indulged in theoretical reasoning beyond the simplest in connection with stellar phenomena. He was basically an explorer whose finds were laid open to mankind in general.

Many of the particulars of instruments given hitherto in this chapter have been derived from a great number of small items taken from material published between 1876 and 1934. Individual references would have been excessively tedious and they are therefore omitted. All details are contained in the body of the photocopies in the accompanying dossier.

Espin's own instruments will now be taken individually. There were three principal items of his devising and a fourth which he tested at the instance of Dr. Spitta.

The first of these was a photometer which he began using in February 1883 and with it Espin introduced a refinement by providing for continuous adjustment of the aperture of the telescope to which the photometer was attached. (2) The constructional features are so well described, with illustrations

and specimen calculations, in the English Mechanic, that it is superfluous to repeat them here when the original can be consulted in the dossier. Of particular interest is the use made by Espin of domestic odds and ends in order to achieve his object. He made a prism required for the total internal reflection of light from a small oil lamp, by cutting it out of a sheet of thick glass. The enclosure for his lamp was made from an old taper box (a Victorian item virtually unknown to-day) . His telescope stops were of cardboard, and most ingenious of all perhaps, was the anchorage of his prism which consisted of a stiffened mass of paper and glue pulp moulded inside the telescope tube.

These details are given as examples of improvisation which, although simple, in combination yielded an instrument with an accuracy within a tenth of a magnitude and all at negligible cost. Profound admiration is the only possible sentiment one can express for such inventive skill and resource. From this flowed the extensive work of star magnitude measurements which Espin carried out in the succeeding years.

To continue. In the account of Espin's connection with the Liverpool Astronomical Society there occurs a note of some remarks he made, as its President, at a meeting of the Society held on 13th April 1885. These concerned an occulting eyepiece which Dr. Spitta had submitted to him for test. The device was due to Edmund Johnson Spitta, a medical man and an F.R.A.S. who described it fully in an illustrated article in the Monthly Notices for December 1884. q.v. However Espin merely spoke of it as consisting of two pairs of moveable shutters

placed at the focus of a Ramsden eyepiece, and it proved to be especially useful in the observation of double stars, for by its aid a faint companion star could be more easily distinguished. Espin's considered opinion was that Spitta's eyepiece filled a long-felt want, but that it had a fault inasmuch as it displayed 'ghosts', so that a danger existed of discovering a non-existent companion star in a pair (3).

The next of Espin's instruments - a spectroscope - was described by him early in 1887, although he made it clear that he had used it in November 1886 (4). Once more his letter, detailed in the reference, gives an adequate description with illustrations, and this obviates reiteration in this text. The background to this invention was outlined in the section on 'Stars with remarkable spectra' q.v. It was quite apparent to Espin that it was an instrument of value as judged by the standards of 1886 and he derived great satisfaction from its use.

He cited some of its capabilities. When used in conjunction with his 17·25-inch reflector during four nights in November 1886 he examined fifty three new stars : in the same month it enabled him to discover seventeen new stars : and particularly impressive was the quality of the spectra it exhibited from stars as faint as the ninth magnitude. Of course the light-grasp of the 17·25-inch mirror would contribute substantially to his results, but when allowance is made for the enthusiasm generated by successful invention, the performance described was still remarkable.

Fourteen years now passed away before the last of Espin's instruments appeared. This was his illuminated micrometer, and details of it were contained in a letter, which, as usual, he

wrote to the English Mechanic where it was published in the issue of 17th August 1900. (5) Brief comment on the device was made when dealing with 'The double stars' and elswhere. Here it is necessary to stress the use he made of the most commonplace objects in the constructional work. A photocopy of his letter giving particulars of this micrometer is in the accompanying papers where Espin's own description and drawings show just how well he utilized whatever was at hand to reach his goal.

It really seems amusing - were it not indeed superb - to make a tally of his components. They included blackened cardboard, glass coated with tinfoil and dipped in mercury, gold paper, a piece of wood with a hole in it, and glass tubing. Veritably from small beginnings great events do spring, and such trifles are recorded in tribute to the fertile mind which gathered them to its use in producing, of all things, this instrument of precision - an illuminated micrometer.

References :-

1 JRASC : 1907 : I : pp. 333-336.

2 EM : 29-6-1883 : XXXVII : p. 384.

3 EM : 24-4-1885 : XLI : p. 166.

4 Combined reference :-
EM : 14-1-1887 : XLIV : pp. 430-431.
O : July 1887 : X : pp. 258-260.

5 EM : 17-8-1900 : LXXII : p. 10.

CHAPTER X

X RAY APPARATUS AND ITS MEDICAL APPLICATIONS : THE TREATMENT OF TUBERCULOSIS : IONIC MEDICATION, AND OTHER REMEDIAL WORK

The themes comprised in this heading might be regarded as excursions made by a cleric into the field of bodily healing, on which basis Espin had the venerable tradition of Scripture to support him. He certainly afforded much benefit to his flock by pursuing these lines of activity which are set out in the order of their relative importance. His X-ray work, which was prompted by scientific curiosity, developed into a hobby, and then continued for seventeen years from 1896 to 1913 as a free ancillary medical service. It will be dealt with first.

Espin's treatment of tuberculosis was a modest example of orthodoxy, free of any apparatus, and on a completely different footing from the foregoing. A description will follow in second place. The treatment now called ionic medication which he practised was an early instance of physiotherapy, and this, together with other remedial work, will be detailed last.

Wilhelm Conrad Roentgen sensed the existence of an emission of hitherto unknown rays on the evening of Friday 8th November 1895 when he observed a fluorescent effect produced by these rays which had been generated within a Crookes tube, on crystals of barium platino-cyanide. Subsequent investigations confirmed their existence and Roentgen, who meanwhile had kept their discovery privy to himself, handed a paper describing the manifestation to the President of the Wurzburg Physical Medical Society on 28th December of that year. It was printed in

Sitzungsberichte der Wurzburger Physik-medic Gesellschaft and reprinted as an English translation by Arthur Stanton, in Nature of 23rd January 1896 (pp. 274-276). In the same issue of Nature there was a contribution from Mr. A.A. Campbell Swinton (pp. 276-277) on Roentgen's discovery and he included an X-ray photograph of a human hand. Copies of the last two items are in the dossier for consultation. As an aside it may be noted that Swinton's photograph is reputed to be the first of its kind ever taken in England.

The events outlined in the previous paragraph caused intense interest throughout the scientific world at the time and since most of the physics laboratories in the universities already possessed the components with which to produce X-rays viz: an induction coil, a Crookes tube, fluorescent materials, photographic plates, and batteries, there was a flurry of inordinate extent in which almost everyone with the means to do so, began to experiment in this new field of activity.

The news similarly affected the vicar of the parish of Tow Law and he too resolved to enquire into the matter. Not, indeed, that he was alone amongst the non-professionals in so doing. Espin must have entered into X-ray work immediately and with zest for as early as March and April of 1896 he was writing letters thereon, and within six months of the announcement in Nature he had acquired sufficient mastery of the technique involved to write a long letter to the English Mechanic on 'Hints to Beginners in Roentgen Ray Work', which he followed up with four more contributions on the topic by September 1897. A collective reference to all of these is given later.

It may be recalled that in 1896 Espin was engaged in the observation of red stars and of those with remarkable spectra. To some extent he was searching for variables and double stars as well. In the same year there appeared a reprint of the 5th edition of Webb's 'Celestial Objects for Common Telescopes' together with the 7th edition of Proctor's 'A Star Atlas for Students and Observers' both of which had been revised by Espin. Overall, therefore, his energies must have been well taxed for he added an interest in the physics of radiation to the diverse astronomical work already in hand.

The letters in the English Mechanic just referred to bear all the marks of enthusiasm. In that of 26th June 1896 he gave explicit instructions in the simplest of terms so that any normal person could follow them and so build his own X-ray apparatus at home, and he had the good sense - as well he might for a six-inch spark coil was recommended - to point out the dangers of exposed wiring. The subsequent letters were similarly informative. One of the suppliers of apparatus named in the letter quoted was the firm of Brady and Martin of Newcastle-on-Tyne, which, being comparatively close to Tow Law, was patronised by Espin.

One of the founders of this company which dealt in scientific and laboratory equipment, was Dr. William Martin of Akenside Terrace, Newcastle-on-Tyne. He was a medical man, not in private practice, whose leanings may be gauged from his memberships of the Society of the Chemical Industry and of the Roentgen Society from its formation. To the latter he contributed a paper on skiagrams as early as 1898. Martin was also a Companion of the Institution of Electrical Engineers

and needless to say he and Espin soon became firm friends. It was mainly due to Martin that his firm produced, in 1896, an X-ray tube which was designed to give a sharp focus, but unfortunately it quickly overheated and so was capable only of intermittent use. Espin was familiar with it and explained its operating features in his letter.

The facility of having at hand a medical man who was also a pioneer radiologist must, inevitably, have been a source of strength as Espin explored this engrossing new pursuit. Moreover Brady and Martin had their own X-ray worker in the person of Mr. A. Lander, who regularly communicated matters of interest to the English Mechanic, as Espin mentioned in one of his own letters to that paper. The knowledge which Espin acquired, purely by experiments, was put to practical use in the X-ray photography of patients referred to him by the local doctors. In September 1896 he specifically stated ..... 'I have mentioned the use of films in dealing with cases the doctors have sent to me' ....., and again, in October 1896 he commented in a letter .....'in came a medical case' ..... . It is established beyond doubt that he carried out, gratuitously, diagnostic work with his equipment well within a year of the discovery of X-rays by Roentgen.

Skiagrams i.e. shadow photographs produced by X-rays, must have been obtained at Tow Law very early indeed. The probability is that Espin undertook what to-day would be termed 'shallow penetration' photographs such as those of bones of the hands, arms, knees, and legs, although on occasion he is reputed to have located swallowed coins. The recollections of the

very few elderly people of the parish who knew Espin indicate that the X-ray apparatus was also used in the treatment of rheumatism and lupus vulgaris but in the complete absence of any certain evidence this is given no higher credence than likelihood. Their memories may well have faded with the years.

The nearest public hospital to Tow Law was the Lady Eden Cottage Hospital at Cockton Hill, Bishop Auckland, almost ten miles distant, but this institution did not acquire X-ray apparatus until seventeen years later i.e. in 1913, so it was fortunate that the parishioners of Tow Law had the facility of free X-ray photography for so long a period.

To return, for a moment, to the letter of 25th September 1896 (already quoted), there are several items in it which show the spread of Espin's investigations at that time. As an Arts graduate of 1881 he would have had no scientific training at Oxford and before that only such elementary instruction in physics and chemistry as the curriculum at Haileybury allowed. Now in the letter he tells of his experimental enquiries into the reason why photographs taken with glass plates yielded better results than those taken with films when obtaining skiagrams : how, electrolytically, he coated lead with copper. He sought to find out the manner in which X-rays could be reflected, and he determined that the positive photographs of metals had intensities proportional to their electrical conductivities, but that aluminium - an alkali metal - was exceptional. All these matters proceeded concurrently.

By February 1897 Espin had had a full year of X-ray experience and he wrote with a measure of authority on his

diagnostic work. The English Mechanic of 26th February 1897 carried a letter from him illustrated by photographs of the two wrists of a sixteen years old boy which clearly showed the transparent effect produced in bone by tuberculosis. This letter is contained in the dossier but since the photographs there are not very well reproduced it has been thought just as well to have the original illustrations in that journal photographed directly and enlarged so that by reading the letter in conjunction with them a more accurate appreciation of Espin's judgment of the effects of tubercular disease can be obtained. It must be stated that the original positive sent by Espin to the English Mechanic would be used to produce their illustration, and the present enlargements are derived from photographs of the latter i.e. they are third in order of reproduction and so suffer from progressive degradation. Even so they serve to show the basis of his opinion and being obtained from exposures made in December 1896 must rank amongst the earliest X-ray records in this country.

The activity of Espin in X-ray work appears to have settled down from its first flush of excitement to a more composed quest. He made no further press contributions on the topic until September 1897 when he wrote of his use of a tinfoil ring at the cathode of an X-ray tube which gave enhanced light emission. In this he was rather tardy for the ground he thus explored had been covered very largely by June 1896 as Mr. Arthur H. Fish pointed out a week after the appearance of Espin's announcement.

Nothing further from Espin is to be found for the next eight years until, in 1905, he sent letters which appeared in three

consecutive issues of the English Mechanic on 'The Wimshurst Machine and X-Ray Work'. The first one embodied his experience in such work during the preceding nine years and is attractive for the odd details it contains. He informs us that ....."My friend, Mr. William Oliver, and myself commenced about two years ago to make experiments with a Wimshurst that had a pair of plates 17 in. diameter' ..... . He could have improved his English somewhat. The letter speaks, too, of Espin's first spark coil of 1896 - a six inch one made by Apps, and of his various X-ray tubes such as that of Brady and Martin mentioned earlier, and a 'Penetrator' tube made by Watson.

He tells how the first Wimshurst with the two 17 inch plates was succeeded by the next with six eighteen inch plates, which was enlarged to twelve plates, and later rebuilt to incorporate twenty plates. Mercifully he was never affected with dermatitis to which X-radiation can give rise. Quite obviously the malignant effects of over-exposure and the need for shielding were not, at that time, within his comprehension, otherwise so grave a matter would not have been glossed over so lightly. These data enliven the monotone of earlier recitals in which one bare fact succeeded another in ascending to an often foreseeable conclusion. There is no chill of detachment : instead an engaging warmth of personal interest.

The second and third letters were concerned with the constructional features of Wimshurst machines and the various refinements which Espin introduced. Since all this material is provided in the dossier no further detail need be given. However, it can be said in surveying all the documentary evidence

presented that in his first seven years of X-ray work (1896-1903) Espin used a spark coil and batteries, after which he concentrated on the use of the Wimshurst machine for the next ten years.

There are still (1972) anecdotes to be heard locally of the exploits of Espin with his X-ray apparatus and their value lies more in the field of entertainment than in fact. From this medley common agreement has been found on these two following statements : first, right from the start of his incumbency in 1888 Espin laid open his vicarage as a gathering ground for the young men of the church, and some of these were always sufficiently curious to want to help him in his various projects - X-rays included from 1896 : second, upon the completion of the large 24-plate Wimshurst machine (of which a photograph with Espin beside it is displayed in the dossier) he employed relays of choirboys to turn its handle, which must have been a wearisome task when its use was continued for any length of time. This was truly a novel use for surplus juvenile energies.

The three letters of 1905 were the last communications he made to the press on X-ray work, and such, consequently, bring to a conclusion this account of his 'hobby' as he called it, but in the long search for later records a singular item was found in the English Mechanic of 24th November 1922. The matter is not directly relevant to Espin, but since it qualifies Roentgen's discovery, leave is asked for its inclusion.

It is occasionally the case that some unresolved oddity attaches to a discovery when such achieves fame, and this may be taken as a mark of the eminence accorded to it : were the

discovery less notable then any singular circumstance would pass unnoticed. On 14th November 1922 - some twenty seven years after Roentgen's discovery at Wurzburg - Mr. William Thomson made a statement to the Manchester Literary and Philosophical Society and produced exhibits in support, to prove that he had taken the initial steps towards the discovery of X-rays, in 1875, by subjecting phosphorescent metallic sulphides to a high-tension electric discharge. He had furnished Sir William Crookes with the basic materials from which the Crookes tube later came to be developed. Roentgen was, of course, experimenting with these tubes when the discovery of X-rays occurred, and Mr. Thomson consequently sought credit for his own contribution.

Whatever the merits of this claim may be it was a very belated one and concerned only with apparatus existing and available to Roentgen, with which he progressed to identify X-radiation, and at that it must be left.

We now come to Espin's treatment of tuberculosis.

It is only too well known that the incidence of consumption, as pulmonary tuberculosis was called, assumed widespread proportions in Victorian times and especially was it prevalent in the so-called 'working class' areas of which Tow Law was typical. The prescription for it was open air treatment, living in well-ventilated rooms, freedom from vigorous exertion, and the provision of a nourishing diet. Towards the latter end of Espin's life large sanatoria for tubercular patients were set up within a few miles of Espin's parish : Holywood Hall at Wolsingham (a former home of the ironmaster

Charles Attwood), and Horn Hall at Stanhope, are examples.

The grounds of the vicarage at Tow Law were an acre and a quarter in extent, the aspect was open on all sides, and the elevation close to one thousand feet above sea level. The cure of the body being complementary to that of the soul Espin determined within rather limited means to initiate his own treatment of those unfortunate parishioners who suffered from this disease. In the grounds, to the south-east of the vicarage building, he had constructed a wooden hut with hinged windows in which was placed a bed for a patient. No further description is needed for by singular good fortune a photocopy of it has been obtained and this may be seen in the dossier. The illustration shows two young men standing in front of the hut on snow-covered ground, whilst to the left-hand rear, part of the church is visible.

At this late date (1972) there remain no certain records of the number or of the type of patients who underwent treatment in this small private sanatorium. Whether they were pulmonary or non-pulmonary is not known. It has, however, been ascertained that a Mr. Jameson benefited from his stay there, and no doubt others did also. It would have been of greater interest were it plain as to who used it , the results obtained, and the subsequent case histories, but too much is forgotten and conjecture is inadmissible. The project was a worthy one, conventional in every detail in the light of knowledge prevailing at that time, and evidently it had a measure of success.

Of the structure itself no trace has remained for many years, and the photocopy referred to is the one and only piece

of evidence that it ever existed. It pioneered the larger publicly-owned sanatoria established in Weardale in later years, but beyond these generalisations no exact data are forthcoming. The account of it therefore must end at this point, and attention is directed to the remainder of Espin's medical work.

In the sphere of modern physiotherapy there is a treatment known variously as ionic medication, medical ionization, or iontophoresis ; its purpose being to introduce ions of a medicament into the body tissues by use of an external battery. The procedure can be illustrated by an example. If it is desired to treat (say) a knee joint, moistened pads are applied to the nearby skin, one pad being soaked with a solution of the curative substance and the other with a very weak saline solution. Electrodes are next placed in close contact with the pads and from them insulated conductors (called rheophores) are taken to the respective poles of a battery. The positions of the pads must be such that the current passing through the leg of the patient has to traverse the affected part. In this way ions of substances are injected directly to the site of the malady without recourse to surgical incision.

Espin knew of this technique well over fifty years ago and applied it successfully. An outstanding instance was the case of Mr. T.R. Brown who was Surveyor of the Tow Law Urban District for many years before Espin's decease in 1934. A paving stone accidentally fell on to one of his hands and crushed it : as a result its use became gravely impaired. The vicar carried out the procedure outlined in the preceding paragraph. in order to apply iodine directly to the affected metacarpal bones,

and a complete cure resulted.

In retrospect it becomes apparent that Espin's knowledge of the mechanism of iontophoresis must have been well-founded for the ions of metals and alkaloids (e.g. magnesium and quinine) are of positive polarity, and those of acid radicals (e.g. sulphonamide and salicylic acid) negative. In the example quoted iodine could only have been forced into the tissues by correct choice of polarity i.e. by connecting the negative pole of the battery to the pad with which it was soaked, otherwise no injection would have taken place. Espin must have foreknown this for he acted with assurance when applying the treatment.

Finally we come to the other remedial work which Espin practised, and two examples will suffice. First there was the case of a parishioner Mr. W.C. Lewis, who, when a young man, had leg trouble and walked with an awkward gait. The treatment applied by the vicar was to stand him in the bath at the vicarage and to play cold water on his legs every day - Sundays excepted - for half an hour at a time. Lewis emerged quite cured and later, being passed as medically fit, joined the Royal Navy. He was, unhappily, killed on active service during the First World War (1914-1918) and his name is included on a war memorial built into the north wall of the church. One is left to ruminate as to the motives which prompted this specific : possibly Espin's knowledge of the radioactive properties of the water in the district had a bearing.

Last of all the needs of the sick and aged were ever present. To them Espin disbursed nutriments such as free milk,

tins of turtle soup, and cod liver oil (for its anti-rachitic vitamin D) dispensed from a Winchester kept at the vicarage. As incumbent of the parish he had under his personal control the administration of the Attwood Charity and he issued 5/- vouchers to the needy which could be exchanged for foodstuffs at the grocery shops in Tow Law. On this last point some rivalry sprang up amongst the grocers as to who should most rightfully have these vouchers, it being held at one time that the co-operative stores, because of their dividends, attracted more than their fair share, but to the credit of the vicar he tried his best to act equably.

Although much more could be written it would add nothing material to what has so far been narrated : thus with its purpose fulfilled this chapter closes.

References :-

(Combined reference : all refer to the English Mechanic)
20-3-1896 : LXIII : pp. 105-106.
24-4-1896 : LXIII : p. 213.
26-6-1896 : LXIII : pp. 422-423.
17-7-1896 : LXIII : p. 499.
25-9-1896 : LXIV : pp. 136-137.
2-10-1896 : LXIV : pp. 162-163.
9-10-1896 : LXIV : p. 188.
16-10-1896 : LXIV : p. 205.
26-2-1897 : LXV : p. 35.
24-9-1897 : LXVI : 135.
1-10-1897 : LXVI : p. 161.
7-4-1905 : LXXXI : pp. 202-203.
14-4-1905 : LXXXI : p. 224.
21-4-1905 : LXXXI : p. 247.
28-4-1905 : LXXXI : p. 266.
12-5-1905 : LXXXI : p. 313.

CHAPTER XI

LOCAL ASTRONOMERS CONTEMPORARY WITH ESPIN

Any impression of Espin as one who turned to astronomy as a vent for innate capacity hemmed in by the demands of a lonely parish can be discounted. It was the very isolation and freedom of the moorland of north-west Durham which provided opportunity for his activities. Moreover he was in touch quite often with others of like inclinations : collectively they formed part of his life portrait so to speak, by filling in a background before which Espin's observational merits were displayed.

Of them some account will be rendered for this sharing of interests acted as a stimulus to him. By far the most important one was Mr. William Milburn and on him the fullest commentary is to be made : the descriptions of others are tailored in diminishing order according to their significances in the pattern of Espin's life and work, and to all this will be appended a brief glance at the more far-ranging acquaintances with whom he maintained correspondence.

In the first place it is clear that telescopic work had proceeded in the area long before Espin's arrival. As early as 1750 Thomas Wright of the hamlet of Byers Green about eight miles from Tow Law published his now famous book 'An Original Theory or New Hypothesis of the Universe' and indeed Wright's observatory still stands reasonably preserved. Only six miles distant is the village of Esh where, in 1844, the incumbent the Revd. Temple Chevallier erected an observatory with a 10·5-inch

reflector. He held the Professorship of Mathematics at Durham University from 29th July 1834, and in 1841 his Chair of Mathematics was combined with that of Astronomy. This union continued until December 1871 when the Professorship of Astronomy was suspended.

The University had its own observatory on the outskirts of Durham from 1841 : Hugh Lee Pattinson F.R.S. erected a 7-inch instrument near Gateshead in 1858, some seventeen miles away, and probably most notable of all was the commissioning of the very well known 25·5-inch Cooke refractor at Gateshead in 1871 by R.S. Newall. Such were the antecedents and from them we move to those who were coeval with Espin, beginning with Milburn.

William Milburn was born of a Tow Law family and whilst quite young became acquainted with Espin at the parish church. This early introduction to the astronomer-cleric was to be very long-lasting for Milburn took up a position as assistant to the vicar in 1912 and this continued without a break until Espin's death in 1934 - a period of twenty two years.

Espin's astronomical activities, of course, began on a personal basis in 1874 at Haileybury so that he had had the lengthy experience of thirty eight years of observational work before he gained the services of William Milburn. He was, in fact, fifty four years of age when he decided to enlist the helping hand - and mind - of this much younger man. Milburn was not the first one to assist him for before his translation to Tow Law and whilst still a curate at Wolsingham, Espin instructed a youth named Nicholas Brown in astronomy. Brown carried out a large part of the work of cataloguing red stars upon which Espin was then

engaged, and which help, indeed, was gratefully acknowledged. (1)

The association of Espin and Milburn was a pleasant one which began by the firm cohesion of a mature gentleman in his fifties, devoted to scientific experiment and discovery on the one hand, and an aspiring young one ready to acquire and apply whatever learning and skill his patron could dispense, on the other hand. It is at this juncture material to say that William Milburn had already shown himself to be a youth of intellectual merit before his collaboration with Espin started. His maternal grandfather had been Dr. John Robin Carr LL.D. of Wolsingham who compiled a dictionary, devised a system of shorthand, and had wide interests including, it is reputed, that of astronomy.

Milburn gained admission to the old Wolsingham Grammar School by means of an Attwood Scholarship and remained there for the full four years which this benefit afforded him. He had a a classical background of some Latin and Greek and matriculated at Hatfield College in the University of Durham. His original intention was to follow a course of study at University either in education or theology, but he became so attracted towards astronomy that this supervened over all else and he became assistant to Espin instead. William Milburn had an acquaintance with French and German - to put it no higher - and a little Italian. His exercise in these tongues developed later during his travels in Europe with Espin. He became a chess player of calibre and was to become the holder of the silver trophy of the Durham County Chess Club in succeeding years.

It may well be imagined how fired with enthusiasm Milburn must have been when the opportunity arose of serving with

Espin, by that time a person of rising eminence in astronomical circles following upon the attention created by his discovery of Nova Lacertae at the end of 1910. Naturally he seized upon it and the outcome was an immense personal satisfaction extending over almost a quarter of a century of observation, discovery, and foreign travel.

Before Milburn took up his duties at the Wolsingham Observatory in 1912, Espin had begun his 'examination of all stars in the Bonner Durchmusterung in certain selected zones with a view to detecting new double stars' (2). The method adopted was to sweep out, night after night, a narrow band of the heavens about 1° wide and to note and measure every star seen in it. In the year 1910 the zones +50° to +55° were under examination. During the next year, 1911, these were mainly completed and then the systematic scanning of the zones +49°, +48°, and +47° , were commenced. (3) When Milburn came in 1912 this work continued and one can visualise the joint efforts of Espin and Milburn in pressing on with this tedious and exacting task. (4) The new recruit must have had fortitude as well as devotion to involve himself in work of such arduous nature

Espin always displayed much kindness to his assistant and even when his mentor had passed away Milburn paid tribute to him in a most sincerely worded obituary (5). The two were often together on annual holidays abroad which was a characteristic relaxation of Espin for a number of years. The faithful service rendered in return may be seen from even a cursory inspection of the scientific literature collected in the dossier, as witness, for example, the painstaking effort which Milburn must

have expended in compiling the lists of micrometrical measures of double stars which appeared in detailed contributions to the Monthly Notices of the Royal Astronomical Society spaced over several years.

As the discoveries of Milburn increased they came to be identified by his personal prefix. A stellar object found by Espin was allotted the prefix E : a similar discovery by Milburn was denoted by M. This conformed with the prevailing practice at that time. Thus Mr. John Birmingham's objects were labelled Birm. and when two observers succeeded together in an identification the names of both were indicated. The joint discoveries of Espin and Birmingham were therefore indicated by Es-Birm. .

Until 1914 a Newtonian reflector of 17·25 inches was employed in the observatory in the grounds of the vicarage at Tow Law and both Espin and Milburn used it. During 1914 a 24-inch reflector was brought into use and housed in the main observatory whilst the 17·25-inch instrument was placed in an adjacent, and smaller, observatory. From this time onwards Espin used the larger telescope and Milburn the smaller one, and the practice arose that when a new object was discovered on one telescope its measurement was carried out on the other one : however this procedure was not invariable, for examples do occur where both discovery and measurement were accomplished with the same instrument.

Quite apart from the discoveries of Espin in person there is an impressive list of those due to William Milburn. They are given separately, in detail, but here it suffices to say

that altogether 1,051 stars were found by him and all are recorded in twenty two separate lists contributed to the Monthly Notices between January 1918 and January 1939 – an average of almost fifty discoveries a year.

Espin, being already a Fellow of many years standing proposed Milburn as a candidate for election to a Fellowship of the Royal Astronomical Society in 1922 (6) and he was, in fact, elected F.R.A.S. at a meeting of the Society in January 1923 (7).

The published material relating to William Milburn is imposing enough, and taken in toto it mirrors his ability as an observer. It extends from 1917 to 1940 and sixty separate items have been traced. They appeared in the English Mechanic, the Monthly Notices of the Royal Adtronomical Society and the Observatory. Apart from the six annual observatory reports which he compiled after Espin's death, and a most moving obituary, all are devoted to astronomical objects and equipment. Every one is set out in a following abstract.

By far the most outstanding single discovery due to Milburn occurred on 14th October 1933 when he found a hitherto unrecorded double planetary nebula in the constellation Cygnus. At first this was thought by him to be a comet, but after a number of days observation during which time no motion of the object was discerned, it was resolved as a nebula. Particulars of the discovery were communicated briefly to the Royal Astronomical Society by Mr. Milburn and Espin's own pride was such that he supplemented Milburn's modest announcement with a more forceful one. The event aroused much interest at the time and the

scientific press publicised the matter. (8)

With advancing years Espin found the demands made upon him by long night hours spent at the telescope to be an increasing burden, and particularly so in winter which, locally, is always considered to be at its most severe at Tow Law, as one might expect at a location 1,000 feet above sea level. The younger and more virile William Milburn being by then well-versed in the techniques of astronomy - observational, photographic, and spectroscopic - was at hand to augment the declining vigour of the senior man. The lists of double star measurements previously mentioned bear this out : at first these carried the names of Espin and Milburn, but towards the end the name of Milburn alone appears.

Upon the death of Espin on 2nd December 1934 the entire course of the astronomical work at Tow Law altered. During the summer and autumn of 1934 Espin had caused two observatories to be constructed on the land within the curtilage of No. 18 Station Street, Tow Law, the work being carried out by Mr. Henry Lough. How Mr. Milburn continued his astronomical work there is given in some detail in the chapter devoted to Espin's personal characteristics (pp. 96-97) q.v.

The needs of national security during the Second World War (1939-1945) made the continuation of observational work virtually impossible, and being perforce relieved of his chosen calling, William Milburn became the wartime Clerk of Tow Law Urban District Council whose offices were then situated a little further along Station Street. After the war he took over High Houseloup Farm, just to the north of Tow Law, where he

remained until 1961, in which year he retired to a bungalow in Ford Lane, Lanchester, named Sylvan Lea. He and his wife still reside there (1972) and both are deeply interested in painting. Mr. Milburn executes his work in oils and manifestly derives great happiness from this pursuit. Chess by correspondence is another of his hobbies.

The outline of William Milburn's life and work thus concluded may be taken in review and considered in relation to Espin himself. It is beyond any doubt that Espin was singularly fortunate in his choice of assistant. The accidents of birth were such that Espin was advantageously placed in the world compared with Milburn. Both rank as sincere men, with considerable natural endowments of intellect, devotion to a calling, and mutual loyalty. Their memorials will repose in the records of astronomical discovery, and in weighing their merits it seems that had their origins been interchanged what is in fact the record of Espin might well have been that of Milburn, and the present record of Milburn would then be that of Espin.

The contemporary next in order is William Henry St. Quintin Gage (1858-1939). This gentleman came of aristocratic stockbeing related to the fifth Viscount Gage. He was educated, like Espin, at Exeter College, Oxford, and it is very likely that the two became acquainted as undergraduates. Gage possessed independent means throughout his life and never had the need to earn his living. He became a member of the Liverpool Astronomical Society about 1881-1882 and was elected F.R.A.S. in 1884.

The first definite association of Espin and Gage

occurred in 1882 when, in concert with Mr. T. Read, all three combined to compile a catalogue of 343 suspected variable stars, and Gage made his own contributions to the English Mechanic in 1894 and 1895, although he was never a frequent correspondent. When Espin removed from West Kirby to Wolsingham in 1885 Gage soon followed, bringing his observatory with him, and the pair lived near to each other in Front Street. How they united with Mr. Amos Mitchell the local meteorologist and utilised the Wolsingham Parish Magazine as a medium for their published data, is described elswhere. (pp. 24-25)

Gage's observatory at Wolsingham continued to function after Espin had moved some four miles away to Tow Law in 1888, and in it he had a very fine collection of instruments including a splendid fifteen inch Calver equatorial reflector and a direct-vision spectroscope. Incidentally in his spectroscopic work Gage used a reflecting prism in preference to a flat.

The affinity between Espin and Gage lasted for many years and it is most probable that they would meet frequently. In this Espin - once more - was fortunate, for Gage had the means, the time, and the skill, effectively to collaborate in astronomical investigations and reference to him in that connection occurs in Espin's press contributions. It is known that Gage remained at Wolsingham past the turn of the century, and then removed to The Battery, at Newquay, in Cornwall, where he continued his telescopic work until his death on 31st December 1939.

In his last Will there was a bequest of some instruments to Espin who predeceased him by five years, thus rendering the gift void, so it does seem from this fact that towards the latter

ends of their lives, when they were 350 miles apart, the two must have lost touch with each other. Another bequest was to Durham University - not, be it noted, to his alma mater, Oxford - and this included the fifteen inch Calver, various observatory apparatus, and his library of astronomical literature. It has been verified that his books, some autographed by Espin, still remain in the Science Library of the University.

In sum, Gage led that life which combined wealth and culture rendered possible. Espin had in him a source of strength for the greater part of a lifetime.

Mr. T.W. Backhouse of West Hendon Lodge, Sunderland, lived a score of miles to the east of Tow Law. He was an amateur astronomer of lifelong standing, an F.R.A.S., and a member of the Newcastle Astronomical Society from its inception : Espin, of course, was President of the same Society until his death in 1934, and by personal contact a friendship arose.

For twenty four years (1871-1895) Backhouse investigated the phenomenon of the Gegenschein and in so doing joined Barnard, Brorsen, and Evershed, as an independent discoverer of that counterglow. He made occasional contributions to the technical press, and in 1886 submitted a paper to the Royal Astronomical Society on the Andromedes shower. Perhaps his most outstanding work was 'A catalogue of 9,842 stars, or all stars conspicuous to the naked eye for the Epoch 1900' published at Sunderland in 1911. Backhouse and Espin were on excellent terms and they often met at the meetings in Newcastle of the astronomical society.

Although there is an absence of documentation it

appears that Espin enjoyed the friendship of Mr. Harold Thomson F.R.A.S. of 37 Larkspur Terrace, Jesmond, Newcastle-on-Tyne, who was a member of the British Astronomical Association and became prominent in that body as Director of its Mars Observing Section in the years 1919 and 1920. Another member of the same association was Mr. C.L. Brook, M.A., F.R.A.S. of Harewood Lodge, Meltham, Huddersfield, who, it may be recalled, contributed substantially towards the cost of rebuilding Espin's observatory after its destruction by a gale on 22nd December 1894, and therefore ranks amongst the truest of friends.

Many others, in great array, come to mind. Amongst the clerics the Revd. T.E.R. Phillips of Yeovil, the Revd. J.J. Muschamp Perry of Alnwick, Northumberland, and the Revd. John Bone of Lancaster - all notable astronomers in the own rights. Members of the laity were more numerous. Howard Grubb, whom Espin knew from his days at West Kirby and who founded, nearby on Tyneside, one of the leading astronomical telescope firms in the world : Frank Sargent of Durham University Observatory : Mr. Lawrence Richardson of Newcastle and several more. Here a dispensation is asked for one small digression : Sargent had a distinction far removed from astronomical work. It was he who actually inserted the third electrode (the grid) into a Fleming diode, so producing the first triode ever made in this country.

Of the remote friends there are numbered Pickering of Harvard from 1883, Dunér of Uppsala, Perrotin of Nice, and Dyson of Greenwich, and the list could be lengthened. The Wolsingham Observatory reports for 1892 and 1893 give them at a glance. But enough has been written : here the chapter must close.

References :-

1 RS : p. 19.

2 MNRAS : Feb. 1911 : LXXI : p. 305.

3 MNRAS : Feb. 1912 : LXXII : p. 284.

4 MNRAS : Feb. 1913 : LXXIII : p. 250.

5 O : Jan. 1935 : LVIII : pp. 27-29.

6 MNRAS : Nov. 1922 : LXXXIII : p.2.

7 MNRAS : Jan. 1923 : LXXXIII : p. 111.

8 Combined reference :-
MNRAS : Jan. 1934 : 94 : pp. 229-230.
O : Feb. 1934 : LVII : pp. 43-44.

PARTICULARS OF THE
DOUBLE STARS DISCOVERED BY Mr. WILLIAM MILBURN

These are to be found in the lists printed in the Monthly Notices of the Royal Astronomical Society as set out below.

Items are in this sequence :-

Year	date	volume	page	numbers of stars discovered.
1918	Jan	LXXVIII	195-197	1 - 35
1919	Jan	LXXIX	215-217	36 - 106
1920	Jan	LXXX	332-334	107 - 149
1921	Jan	LXXXI	235-236	150 - 182
1922	Jan	LXXXII	191-192	183 - 241
1923	Jan	LXXXIII	159-160	242 - 275
1924	Jan	LXXXIV	167-169	276 - 322
1925	Jan	LXXXV	280-281	323 - 376
1926	Jan	LXXXVI	135-137	377 - 440
1927	Jan	LXXXVII	222-224	441 - 510
1928	Jan	LXXXVIII	187-188	511 - 551
1929	Jan	LXXXIX	270-271	552 - 591
1930	Jan	XC	321-322	592 - 630
1931	Jan	XCI	295-296	631 - 673
1932	Jan	92	218-220	674 - 732
1933	Jan	93	194-196	733 - 806
1934	Jan	94	256-258	807 - 912
1935	Jan	95	299-300	913 - 969
1936	Jan	96	268	970 - 997
1937	Jan	97	223	998 - 1,025
1938	Jan	98	224	1,026 - 1,032
1939	Jan	99	278	1,033 - 1,051

ABSTRACT OF PUBLISHED MATERIAL ISSUING FROM Mr. WILLIAM MILBURN

(1912 - 1940)

Where references concern the joint work of Milburn and Espin they are indicated thus : (M+E) . Those personal to Milburn are marked (M).

Items are in this sequence :-

Source : date : volume : page : brief title.

Years 1912, 1913, 1914, 1915, and 1916 : nil

Year 1917 :

EM : 23-2-1917 : CV : 82.
A double star near Algol (M)

Year 1918 :

MNRAS : Jan. 1918 : LXXVIII : 195-197.
New double stars (M)

Year 1919 :

MNRAS : Jan. 1919 : LXXIX : 215-217.
New double stars (M)

EM : 11-4-1919 : CIX : 140.
The star α Hydrae (M)

EM : 15-8-1919 : CX : 42.
The new variable star in Lyrae (M)

EM : 5-9-1919 : CX : 79.
The double star γ^2 Andromedae and the variable star near α Lyrae. (M)

Year 1920 :

MNRAS : Jan. 1920 : LXXX : 329-330.
Micrometrical measures of double stars. 14th series. (M+E)

MNRAS : Jan. 1920 : LXXX : 332-334.
New double stars. (M)

EM : 27-8-1920 : CXII : 64.
The measures of binary stars. (M)

EM : 17-9-1920 : CXII : 95.
Denning's new star. (M)

EM : 1-10-1920 : CXII : 119.
Nova Cygni. (M)

EM : 22-10-1920 : CXII : 149-150.
A reply to Spencer's letter on the magnitudes of various stars. M)

EM : 29-10-1920 : CXII : 161.
Nova Cygni. (M)

Year 1921 :

MNRAS : Jan. 1921 : LXXXI : 235-236.
New double stars. (M)
EM : 22-4-1921 : CXIII : 145.
Webb's Celestial Objects' . (M)

Year 1922 :

MNRAS : Jan. 1922 : LXXXII : 191-192.
New double stars. (M)

Year 1923 :

MNRAS : Jan. 1923 : LXXXIII : 154-156.
Micrometrical measures of double stars
17th series. (M+E)
MNRAS : Jan. 1923 : LXXXIII : 159-160.
New double stars. (M+E)

Year 1924 :

MNRAS : Jan. 1924 : LXXXIV : 162-164.
Micrometrical measures of double stars
18th series. (M+E)
MNRAS : Jan. 1924 : LXXXIV : 167-169.
New double stars. (M)
EM : 25-1-1924 : CXIX : 25.
Stellar measurements. (M)
EM : 7-3-1924 : CXIX : 107.
Telescopic powers. (M)

EM : 28-3-1924 : CXIX : 151.
Stellar photography. (M)
EM : 4-4-1924 : CXIX : 165.
Celestial photography. (M)

Year 1925 :

MNRAS : Jan. 1925 : LXXXV : 276-278.
Micrometrical measures of double stars
19th series. (M+E)
MNRAS : Jan. 1925 : LXXXV : 280-281.
New double stars. (M)

Year 1926 :

MNRAS : Jan. 1926 : LXXXVI : 131-132.
Micrometrical measures of double stars
20th series. (M+E)
MNRAS : Jan. 1926 : LXXXVI : 135-137.
New double stars. (M)

Year 1927 :

MNRAS : Jan. 1927 : LXXXVII : 215-220.
Micrometrical measures of double stars 21st series. (M+E)
MNRAS : Jan. 1927 : LXXXVII : 222-224.
New double stars. (M)

Year 1928 :

MNRAS : Jan. 1928 : LXXXVIII : 187-188.
New double stars. (M)

Year 1929 :

MNRAS : Jan. 1929 : LXXXIX : 270-271.
New double stars. (M)

Year 1930 :

MNRAS : Jan. 1930 : XC : 317-319.
Micrometrical measures of double stars 22nd series. (M+E)
MNRAS : Jan. 1930 : XC : 321-322.
New double stars. (M)

Year 1931 :

MNRAS : Jan. 1931 : XCI : 295-296.
New double stars. (M)

Year 1932 :

MNRAS : Jan. 1932 : 92 : 214-215.
Micrometrical measures of double stars 23rd series. (M+E)
MNRAS : Jan. 1932 : 92 : 218-220.
New double stars. (M)

Year 1933 :

MNRAS : Jan. 1933 : 93 : 192-193.
Micrometrical measures of double stars 24th series. (M+E)
MNRAS : Jan. 1933 : 93 : 194-196.
New double stars. (M)

Year 1934 :

MNRAS : Jan. 1934 : 94 : 229.
Observations of a double nebula in Cygnus. (M)
MNRAS : Jan. 1934 : 94 : 255-256.
Micrometrical measures of double stars
25th series. (M+E)
MNRAS : Jan. 1934 : 94 : 256-258.
New double stars. (M)
O : Feb. 1934 : LVII : 43-44.
Milburn's Paper to the Royal Astronomical Society
on his discovery of a planetary nebula. (M)

Year 1935 :

MNRAS : Jan. 1935 : 95 : 298-299.
Micrometrical measures of double stars
26th series. (M)
MNRAS : Jan. 1935 : 95 : 299-300.
New double stars. (M)
O : Jan. 1935 : LVIII : 27-29.
Obituary of Espin. (M)
MNRAS : Feb. 1935 : 95 : 379.
Wolsingham Observatory Report for 1934. (M)

Year 1936 :

MNRAS : Jan. 1936 : 96 : 266-267.
Micrometrical measures of double stars
27th series. (M)
MNRAS : Jan. 1936 : 96 : 268.
New double stars. (M)
MNRAS : Feb. 1936 : 96 : 337.
Wolsingham Observatory Report for 1935. (M)

Year 1937 :

MNRAS : Jan. 1937 : 97 : 222-223.
Micrometrical measures of double stars
28th series. (M)
MNRAS : Jan. 1937 : 97 : 223.
New double stars. (M)
MNRAS : Feb. 1937 : 97 : 331.
Wolsingham Observatoru Report for 1936. (M)

Year 1938 :

MNRAS : Jan. 1938 : 98 : 223.
Micrometrical measures of double stars
29th series. (M)
MNRAS : Jan. 1938 : 98 : 224.
New double stars. (M)
MNRAS : Feb. 1938 : 98 : 300.
WolsinghamObservatory Report for 1937. (M)

Year 1939 :

MNRAS : Jan. 1939 : 99 : 278.
Micrometrical measures of double stars 30th series. (M)

MNRAS : Jan. 1939 : 99 : 278.
New double stars. (M)

MNRAS : Feb. 1939 : 99 : 368.
Wolsingham Observatory Report for 1938. (M)

Year 1940 :

MNRAS : Feb. 1940 : 100 : 302.
Wolsingham Observatory Report for 1939. (M)

CHAPTER XII

DECEASE : OBSEQUIES : WILL AND ITS TWO CODICILS : THE DISPERSAL : MEMORIALS

The procession of events manifest in any life lead always to a decline and to an end. To deal with these least attractive parts is an exercise tinged with melancholy, but being by this time versed in the achievements which have gone before it serves to bring forth that respect which the occasion requires, and thereby, it is hoped, a fitting closure of the subject.

In the case of Espin faculties did not fail prematurely: his interests continued, even on a reduced scale, almost to the end of his life which well exceeded the traditional threescore years and ten. This plaintive theme begins early in the year 1934 when because of indifferent health he was unable to carry out any observational work. By July it became known that, on medical advice, he had been obliged to cancel his usual summer holiday, and thenceforward the tale is one of recession until December when the end came.

It was early in the morning of Sunday 2nd December 1934 when Espin passed away in his vicarage at Tow Law, the immediate cause being heart failure and bronchitis, to which, naturally, senility contributed, and the funeral followed four days later in his own church of S. Philip and S. James. The press, local and national, avid as always for news, published their obituaries of which a selection is included in the dossier, and followed that with over-elaborate descriptions of the obsequies. Beyond

saying that every group in the society in which Espin had moved was represented, a tedious and indeed distasteful recital of 'those present' will be passed over.

In more restrained manner three points may be noted viz: that being an only child whose parents had both died years before, Espin had no kith and kin as normally understood to mourn him, and such task was borne, with much sincerity, by Mr. William Milburn. Next his only surviving relative Colonel William Mallam Phillips of Lincoln, who was a cousin and residuary legatee, attended the last rites, and finally a custom prevalent in the English Church for time out of mind, but which latterly has fallen somewhat into disuse, was most strictly observed. This was the use as the place of interment of a site reserved as near as possible to the threshold of the church for any of its incumbents who should die whilst in office, notwithstanding that Tow Law churchyard had been otherwise closed for burials for fifty years past.

Directly the ceremonies of death were completed the disclosure of the contents of Espin's last Will were made and arrangements put in hand for the realisation and disposal of the estate. This seemingly hasty procedure, lacking one may think in decorum, was almost compulsory for upon the expiry of Espin his freehold of the vicarage ceased, and during the interregnum until his successor the Revd. P. W. Slater was appointed a few months later there was no clergy income, nor indeed any title to tenancy, although the usual grace until exit was allowed.

Testamentary dispositions can now be considered. It was about 1914 when Espin made his first Will, the exact date of which cannot be traced for it is presumed that he followed the

legal practice of destroying utterly the Will when it was replaced by a later one. All the evidence now remaining is contained in the Report of the Oxford University Observatory for 1919 in which Professor Turner referred to a legacy provided by Espin and previously mentioned in a Report for 1914-1915. The provision at first was for the 24-inch Calver equatorial telescope together with an annual sum of L.150 to pay the salary of an assistant, to be left to the University Observatory. Turner, in fact, had it in mind to use Espin's reflector as a replacement for the 13-inch de la Rue instrument already there. The 1919 Report went on to say that Espin proposed to increase the annual payment to L.350 and to donate his house at Tow Law as well in order that astronomy students of Oxford might occupy it and use the telescope on the site.

The last, and therefore effective, Will, was executed by Espin on 3rd August 1920. A first codicil was added on 22nd May 1924 and a second codicil on 2nd January 1930. Taken together thgse three instruments occupy thirteen foolscap sheets of typescript, and should any details be sought such can be derived from copies authenticated by the Registry of the High Court which are enclosed in the dossier. For present purposes the following provisions, broadly stated, are relevant :-

In the Will proper, the major part of Espin's estate was to be vested in Oxford University upon trust for the furtherance of astronomy and for the maintenance of an observatory in northern England. William Milburn was to be the salaried observer with the use of Espin's house in Station Street, Tow Law. In the event of refusal of this trust then it had to be vested in

the two executors and W.M. Phillips who were to apply it to the same intent. The first codicil enabled any scientific instruments or books to be sold and the proceeds added to the residuary estate. The second codicil appointed a local solicitor as third executor. The gross value of Espin's estate, as sworn in the Probate Registry at Chester, was L.12,399 and its equivalent value in 1972 amounted to L.42,660

The course of events in the years which followed the decease of Espin were radically different from what anyone could have foreseen. They are largely described elswhere. Oxford University did, in fact, decline the trusteeship offered in the Will : Mr. Phillips took the articles bequeathed to him, and apart from astronomical equipment, much of the remainder was sold.

The fate of Espin's apparatus has been the subject of prolonged and widespread enquiry, as a result of which his 5-inch refractor, and the Calver 17·25-inch and 24-inch reflectors have been found (1972). A concise account of each one is given as a matter of interest.

The record of the 5-inch refractor, made by Troughton and Simms, of 7 ft 6 ins. focal length, with equatorial mounting and clockwork drive, which was acquired by Espin in 1914, will be dealt with first for it has by now undergone change. To give the full story it is necessary to revert to Durham University in 1910. In that year Professor R.A. Sampson M.A. F.R.S., who held the Chair of Mathematics, vacated that office in order to take up the appointment of Astronomer-Royal for Scotland, and he left behind the tube of a 5-inch refracting telescope which he had

used whilst at Durham. This remained for many years in Durham Castle until Dr. C. Gilbert of the Department of Mathematics of Newcastle University heard of it when attending an academic meeting. The relic, being unwanted, was offered to him, and it is now united with the right ascension and declination circles taken from the 5-inch refractor formerly at Tow Law. A new object glass and a modern transistorised slow-motion drive have been added to form a complete telescope assembly.

The present instrument, therefore, is a Sampson-Espin hybrid, and it stands in the grounds of Christon Bank farmhouse about seven miles north of Alnwick in Northumberland, which property is used by Dr. Gilbert as a week-end and holiday home. A photograph showing details of the telescope is in the dossier.

Next there is the 17·25-inch reflector supplied to Espin in 1885 by Mr. George Calver. Its original focal length was 11 ft. and it had an equatorial mounting and a driving clock. This instrument was acquired from Mr. Milburn after the closure of observational work at No. 18 Station Street, Tow Law, by Mr. David Sinden, of The Poplars, Coley Hill, North Walbottle, Newcastle-on-Tyne, and it passed from him to Mr. A.C. Heslop of 63 Brockenhurst Drive, Hastings Hill, Sunderland. Now (1972) it is housed in a low hemispherical dome in the small rear garden of No. 33, Dene Lane, Fulwell, Sunderland (the home of Mr. Heslop's parents) and has been adapted for use as a short-focus - about 3 ft. - Naismith Cassegrain. The speculum has been re-figured for this new focal length and the telescope in its present form bears no resemblance to that which it had when at Tow Law. For this reason it was not photographed.

Finally the 24-inch reflector with clockwork drive, made by Calver in 1914, was similarly obtained by Mr. Sinden and at the present time the speculum is in his hands for re-silvering. It is intended to install it at the Newcastle University Observatory at Close House, near Heddon-on-the-Wall, about eight miles due west of Newcastle-on-Tyne.

The search for other items which went to make up Espin's array of equipment has brought forth virtually nothing. Indeed close on forty years elapsed before this began and the dispersal had by then proceeded too far, so that for the remainder, regrettably, no traces survive

Eminence such as Espin's requires no advertisement for it stands apparent to everyone. Equally so posthumous adulation would mar a portrayal of the life and work of the man which has been the purpose of this discourse. For these reasons the memorials erected to his memory will be described briefly : far better ones remain in the discoveries he made during life. There are three in all and they are to be found at the parish church of Tow Law. Photographs, in colour, accompany this record.

The most impressive is a stained glass window in the south wall of the church near to the lectern, which depicts the patron saints S. Philip and S. James. It was dedicated with great magnanimity by Dr. Hensley Henson, the bishop with whom Espin had been at issue, on 1st May 1938. Within the chancel and on the north wall is a panel containing a record of his vicariate and an inscription to his memory. Finally the grave itself, a few paces from the west door, is marked by a plain stone cross on a plinth of three steps, the middle one of

which has carved upon it in deep-cut lettering these words 'Grant unto him eternal rest and let perpetual light shine upon him'. Sic transit gloria mundi.

Recent events justify an epilogue. In August 1970, almost thirty-six years after Espin's death, a meeting of the International Astronomical Union was held at Brighton, at which names were assigned to features on the 'far side' of the lunar surface which had become known by the photography of space exploration. As may be seen on the accompanying map one such is Mount Espin whose selenographical co-ordinates are 28 N. lat : 109 E. long. Thus perpetuated he joins the immortals.

A CHRONOLOGY OF THE LIFE OF THE REVD. T.H.E.C. ESPIN

Note : Each year of Espin's age commenced on 28th May.

Year:	Age:	Events:
1858	0	28th May : born at Birmingham
1872	14	September : entered Edmonstone House, Haileybury, as a boarder.
1873	15	The Revd. F.J. Hall, a form master, prompted Espin's interest in astronomy.
1874	16	17th April : the appearance of Coggia's comet (1874 : III) encouraged further observational work.
1876	18	5th May : Espin wrote his first letter to the English Mechanic over the subscript T.E.E. on the subject of θ Orionis. July : left Haileybury.
1877	19	7th December : Espin wrote of his methods for squaring numbers and testing telescopes.
1878	20	11th January : elected to a Fellowship of the Royal Astronomical Society. January : matriculated at Exeter College, Oxford.
1881	23	Spring or Summer : left Oxford with a B.A. (2nd class honours). Founder member of the Liverpool Astronomical Society.
1882	24	Ordained deacon. Appointed to a curacy at West Kirby, diocese of Chester.
1883	25	Consecrated priest by the Bishop of Chester. February : photometer for determining stellar magnitudes brought into use. Publication of Espin's lecture on the comet of 1882.
1884	26	Publication of Espin's catalogue of the magnitudes of 500 stars.

Year:	Age:	Events:
1885	27	Espin's test of an occulting eyepiece. Curacy at West Kirby ended. Appointed to a curacy at Wolsingham, diocese of Durham. Wolsingham Observatory established with a 17·25 inch Calver reflector.
1886	28	First Circular of the Liverpool Astronomical Society. Publication of Espin's Elementary Star Atlas. November : first use of his spectroscope on red stars.
1887	29	Last Circular (No. 16) of the Liverpool Astronomical Society. First Wolsingham Observatory Circular (No. 17)
1888	30	Curacy at Wolsingham ended. Appointed as Perpetual Curate of Tow Law, diocese of Durham. Removal of the Wolsingham Observatory to Tow Law.
1890	32	Resignation from the Liverpool Astronomical Society. 24th October : Espin becomes a founder member of the British Astronomical Association and is elected Director of its Spectroscopic and Photographic Section. Publication of Espin's revision of Birmingham's catalogue 'The Red Stars'. First report of the Wolsingham Observatory. (These continued, annually, until 1939) Created Justice of the Peace for the County of Durham.
1893	35	Elected a Corresponding Member of the Royal Astronomical Society of Canada. Degree of M.A. conferred by Oxford University. Publication of Vol. I of the 5th edition of T.W. Webb's 'Celestial Objects for Common Telescopes' revised and greatly enlarged by T.E. Espin.
1894	36	Publication of Vol. II supra. 22nd December : wreck of the observatory at Tow Law by a gale.

Year:	Age:	Events:
1895	37	14th April : observational work restarted in the rebuilt observatory. Publication of the 19th edition of R.A. Proctor's 'A New Star Atlas' revised and corrected by T.E. Espin.
1896	38	Spring : experiments in X-ray work and medical diagnosis commenced. Publication of the 6th edition of T.W. Webb's 'Celestial Objects for Common Telescopes', Vols I and II, being a reprint of the 5th edition of 1893-1894. Publication of the 7th edition of R.A. Proctor's 'A Star Atlas for Students and Observers'. revised and corrected by T.E. Espin.
1897	39	June : lecture on 'The formation of the Great Whin Sill'.
1898	40	Investigations into spirit photography.
1900	42	Espin devised an illuminated micrometer for telescopic measurements.
1902	44	Last Circular (No. 49) of the Wolsingham Observatory.
1903	45	Commencement of experiments with a Wimshurst machine for X-ray work.
1904	46	5th February : elected President of the Newcastle Astronomical Society. (He held this office until his death 30 years later)
1910	52	30th December : the discovery of Nova Lacertae.
1911	53	Elected to a Fellowship of the Astronomical Society of Mexico.
1912	54	Mr. William Milburn appointed as Espin's assistant.
1913	55	February : the Royal Astronomical Society presented Espin with the Jackson Gwilt Medal and Gift. Elected a Member of the American Astronomical Society.

Year:	Age:	Events:
1914	56	Installation of a new 24-inch Calver reflector at the Wolsingham Observatory, Tow Law. The first Will, containing a legacy to Oxford University. Elected a Fellow of the American Astronomical and Astrophysical Society.
1917	59	Publication of T.W. Webb's 'Celestial Objects for Common Telescopes', Vols I and II, 6th edition, thoroughly revised by T.E. Espin.
1920	62	3rd August : the second Will.
1924	66	22nd May : the first codicil to the second Will.
1928	70	19th October : last letter to the English Mechanic.
1930	72	2nd January : second codicil to the second Will
1934	76	2nd December : decease at Tow Law vicarage.