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The Coniacian - Lower Campanian of the
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**Sequence stratigraphy of a pelagic chalk succession:
The Coniacian – Lower Campanian of the Anglo-Paris Basin**

Simon F. Grant

Department of Geological Sciences

University of Durham

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A thesis submitted to the University of Durham
in partial fulfilment of the degree of Doctor of Philosophy.

Volume 2
Appendices



12 AUG 1998

“Brevis esse laboro,
Obscurus fio.”

Horace, *Ars Poetica* 1.25

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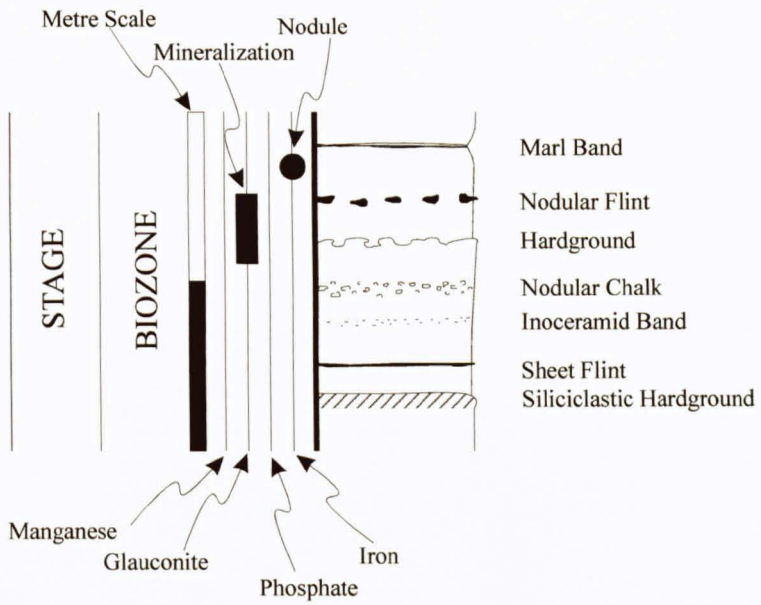
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Key to logs (Chapters 1 – 6 and Appendices A, B & D)



- | | |
|---------------------|--------------------------|
| △ Echinoid | ⊕ Abundant fossil debris |
| ∟ Echinoid Spine | ∇ Sponge |
| ○ Bivalve | ⊖ Porispherid sponge |
| = Inoceramid debris | ⊕ Bryozoa |
| ∪ Brachiopod | ☆ Crinoid |
| ▴ Belemnite | ⊕ Gastropod |
| ⊙ Ammonite | ∪ Serpulid |
| ∪ Fish debris | ⊕ Coral |

∪ *Thalassinoides*

∪ *Planolites*

∪ *Chondrites*

∪ *Zoophycos*

∇ Borings

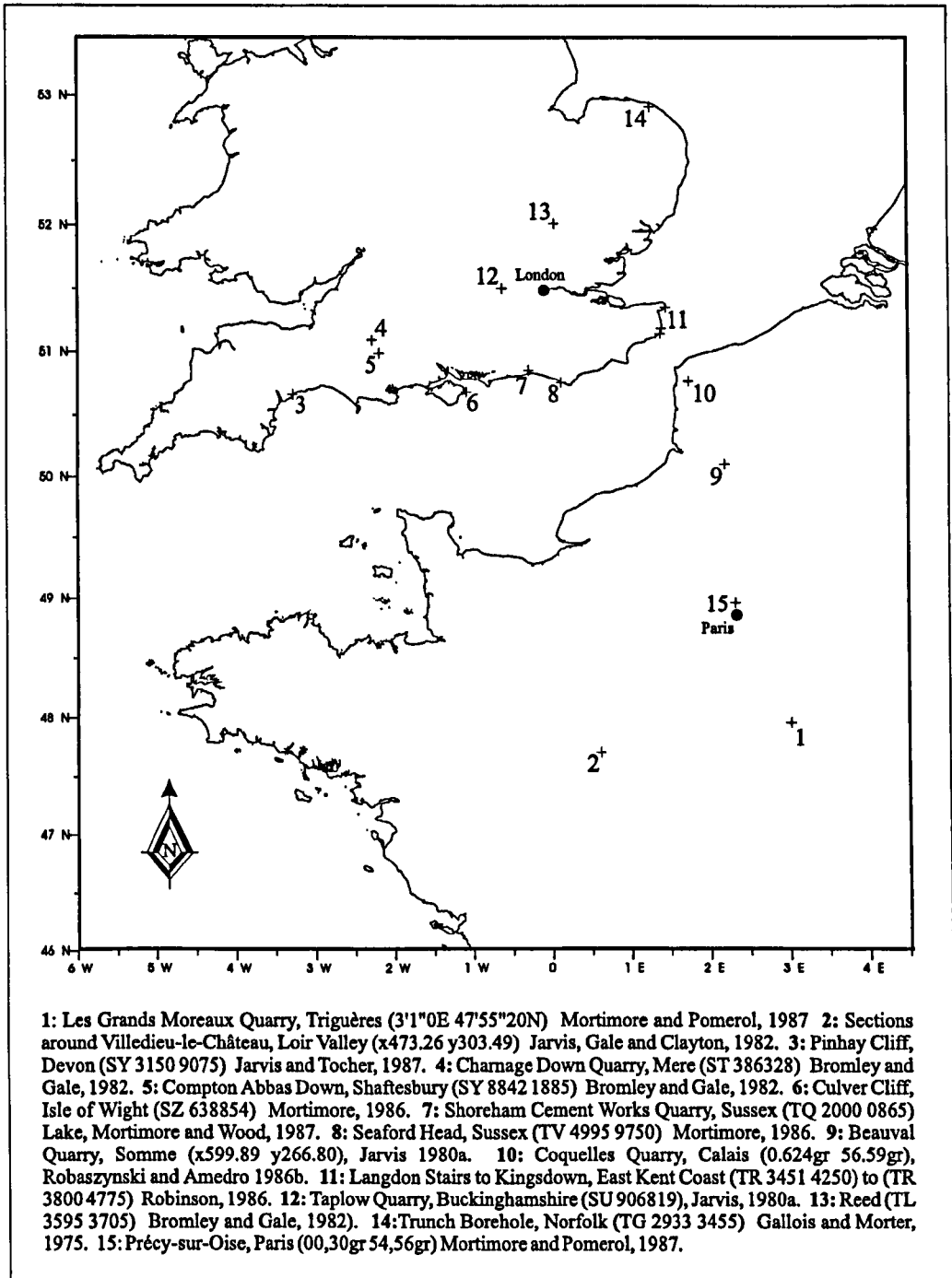
● Nodules

- | | | |
|--|--|-----------------------------|
| | | Highstand Systems Tract |
| | | Transgressive Systems Tract |
| | | Lowstand Systems Tract |

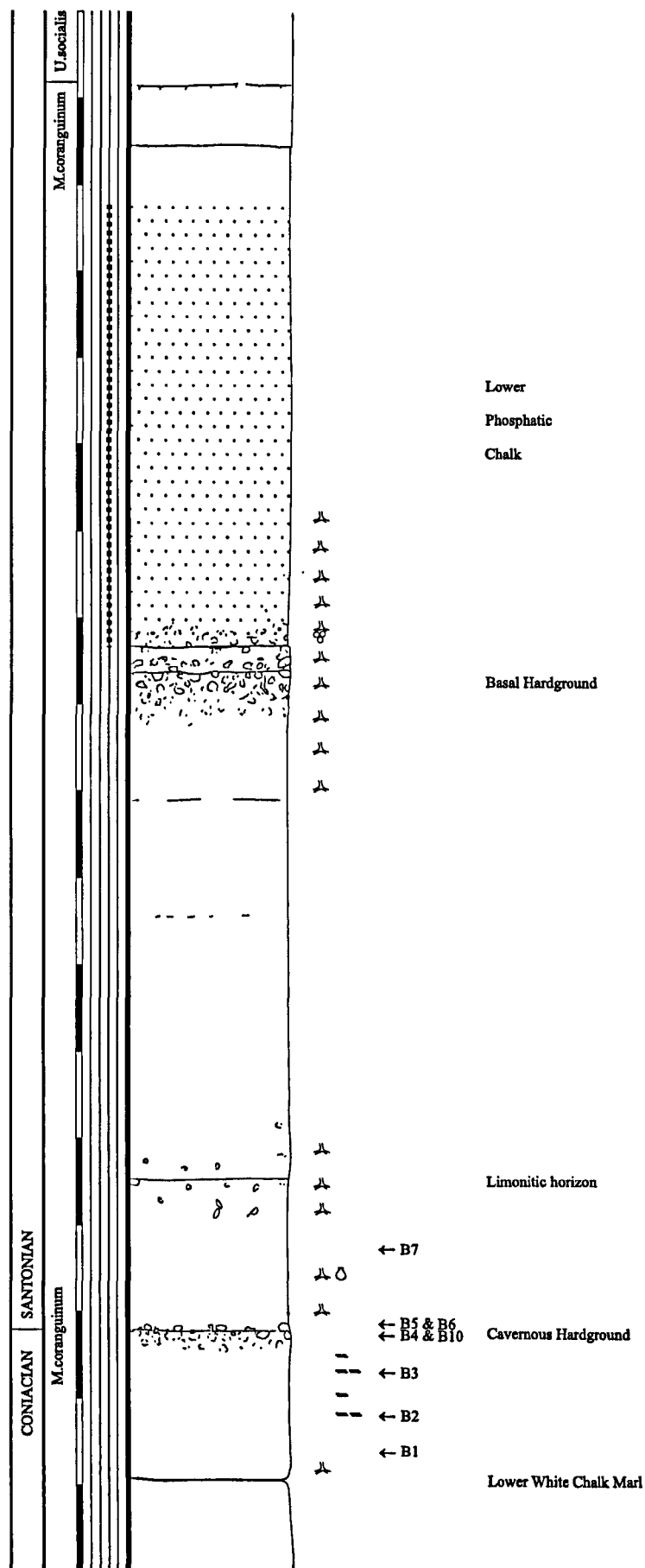


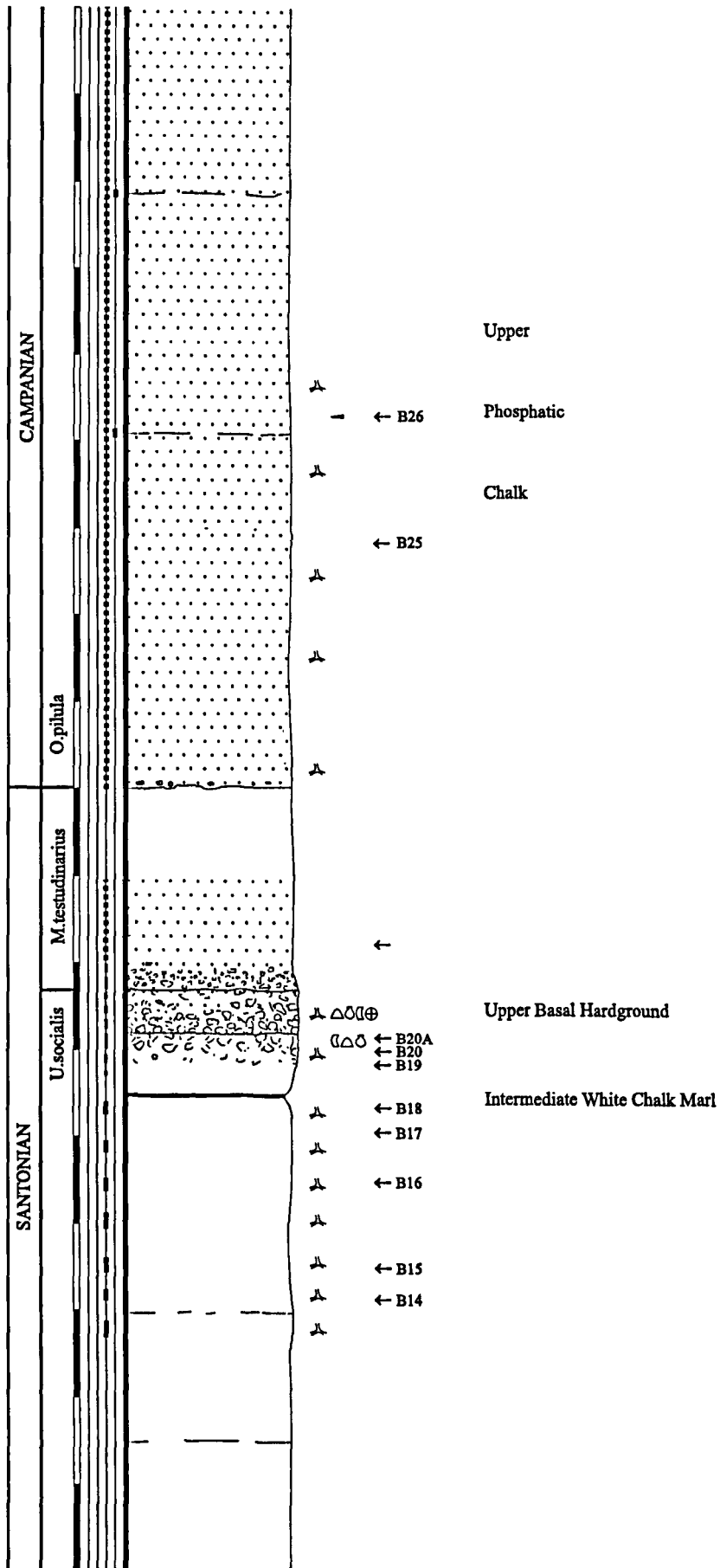
Appendix A

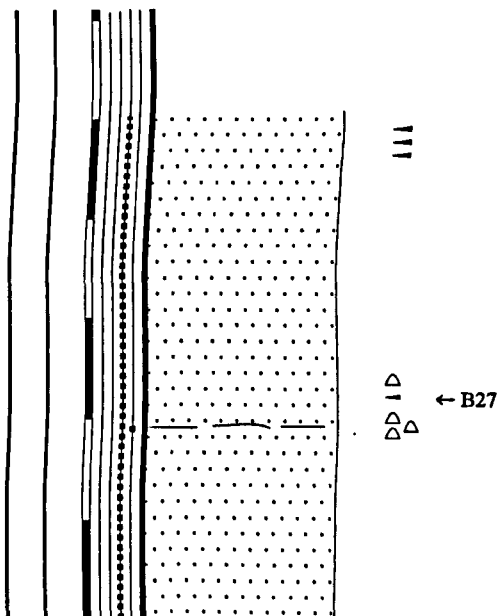
Graphic logs

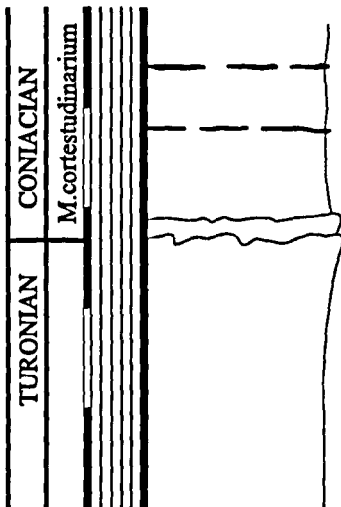


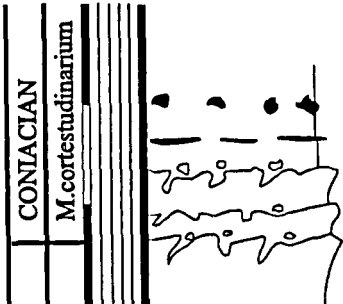
Map showing section localities. Local sketch maps and section descriptions can be found in the reference for each locality, listed above, and are not reproduced herein. See inside front cover for a key to the logs.

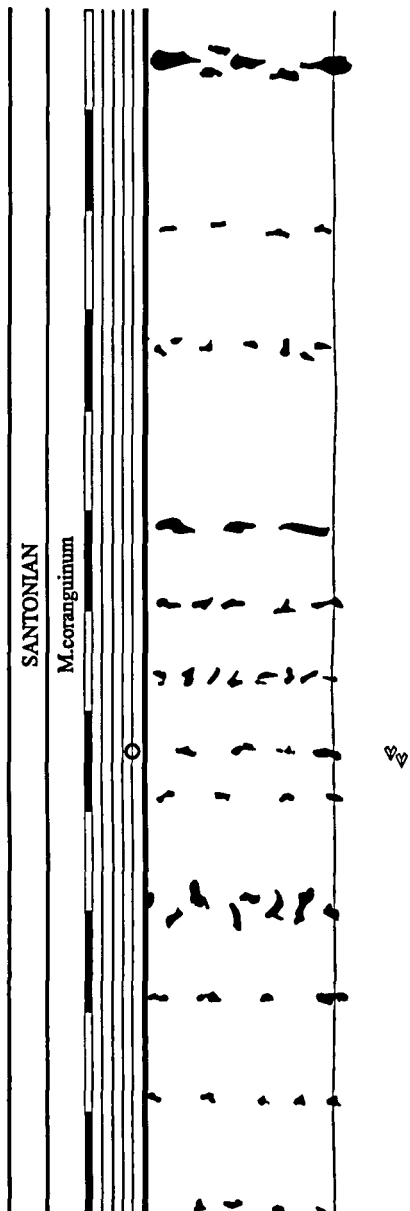






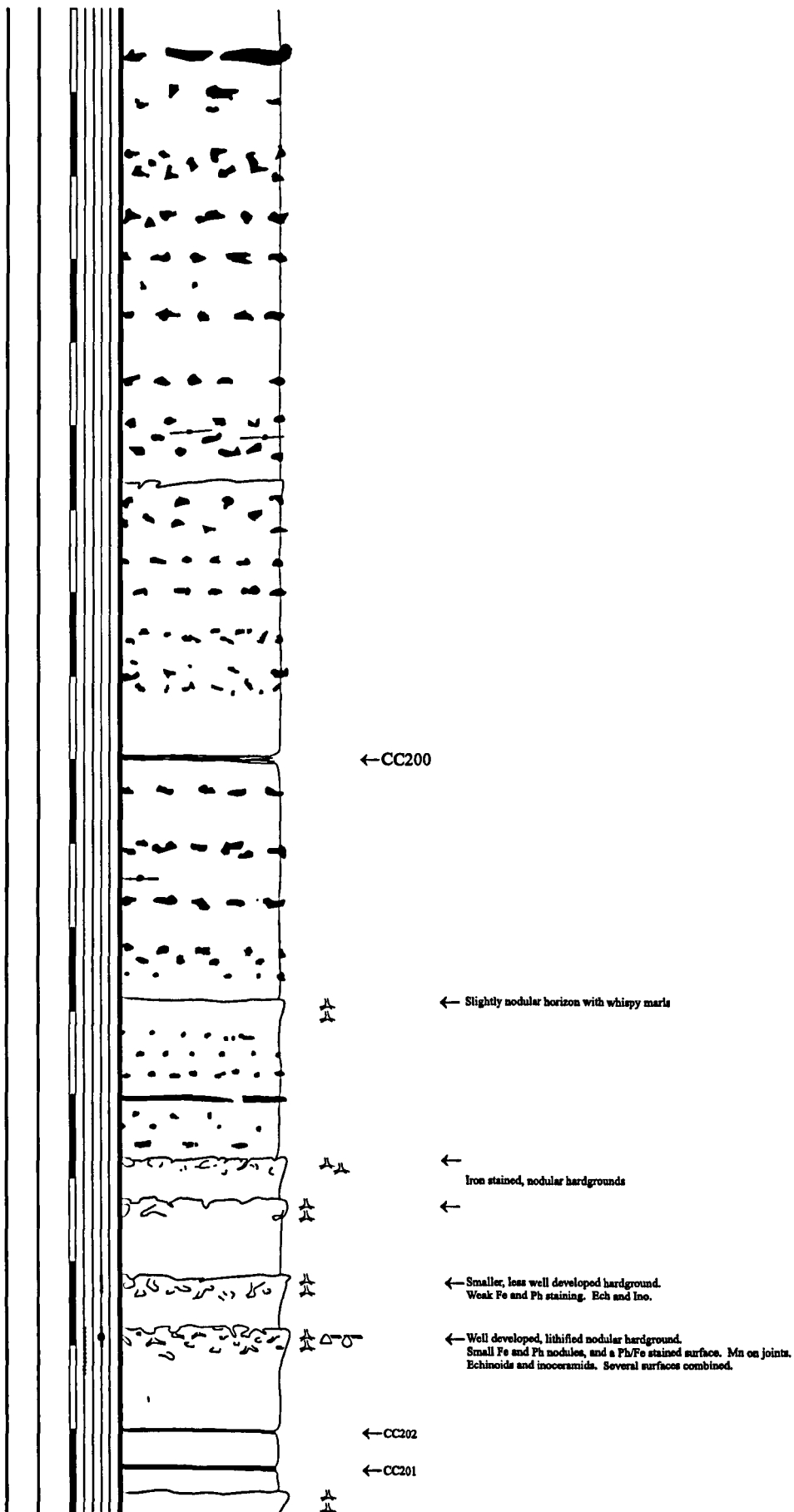


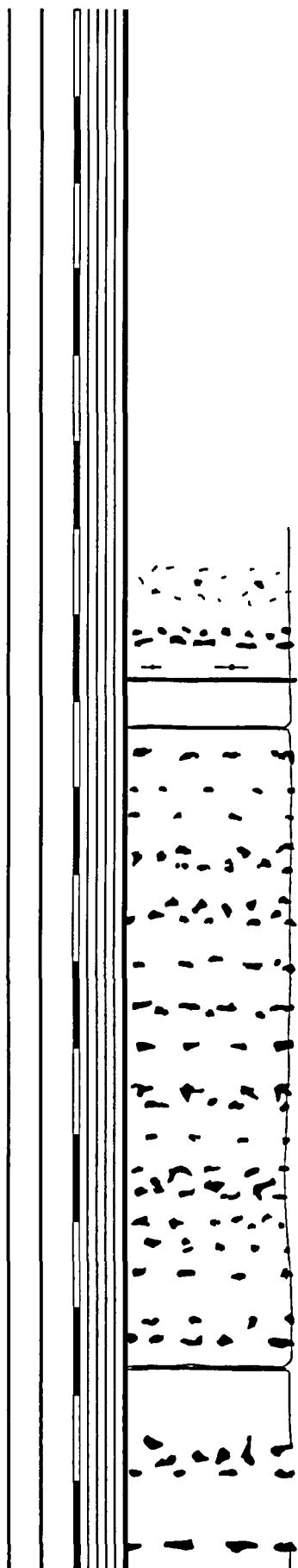




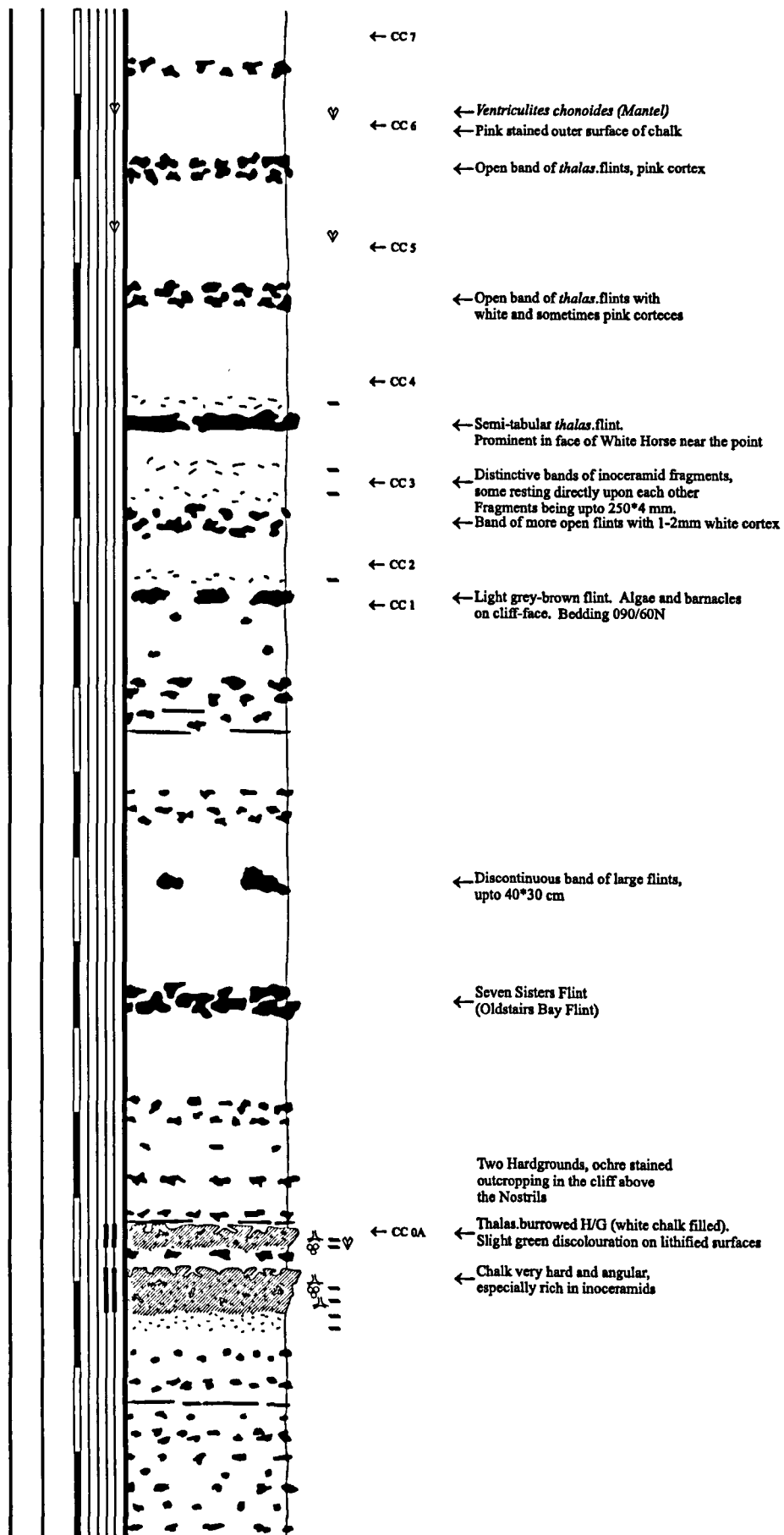
Whitaker's 3 Inch Flint

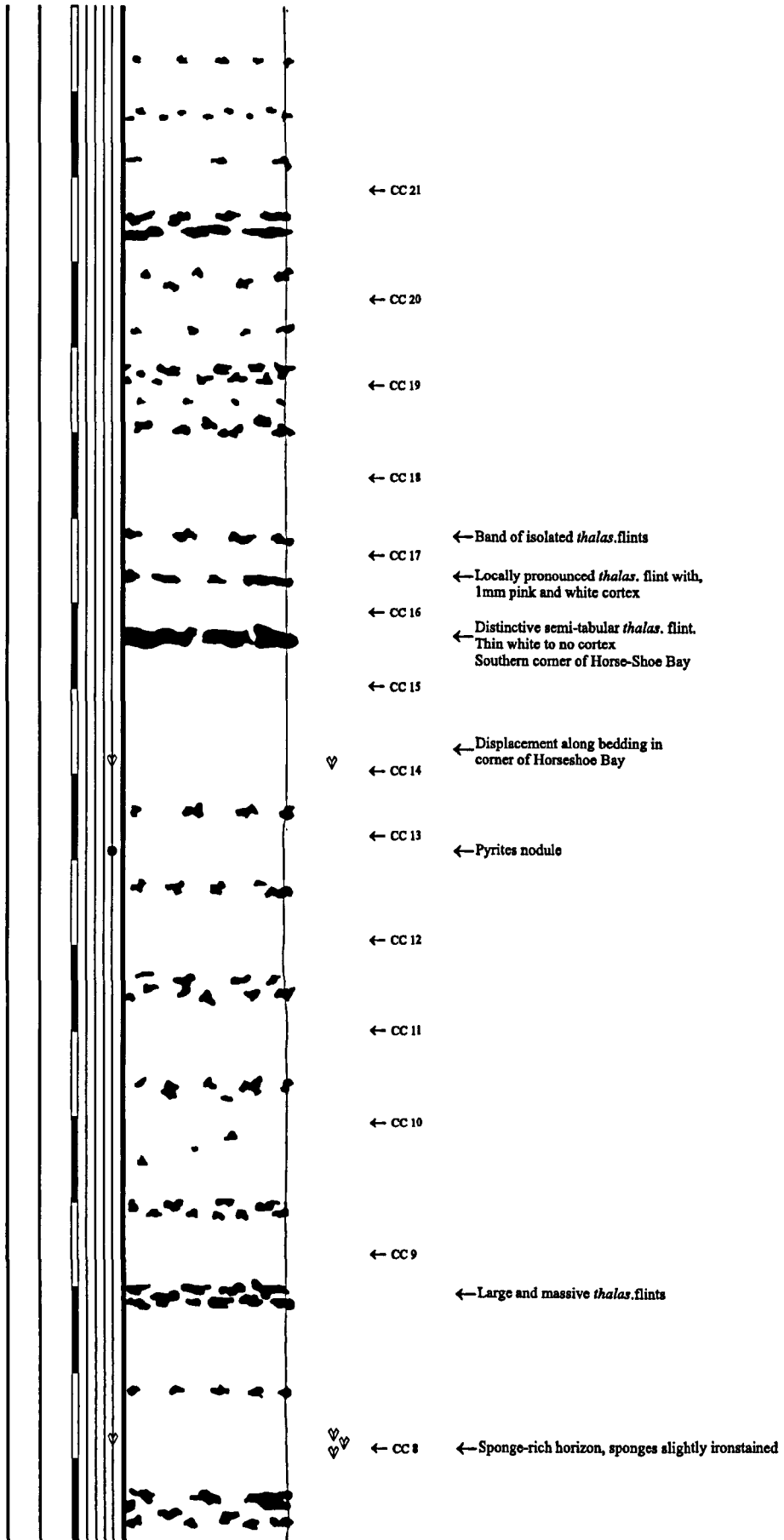
Bedwell's Columnar Flint

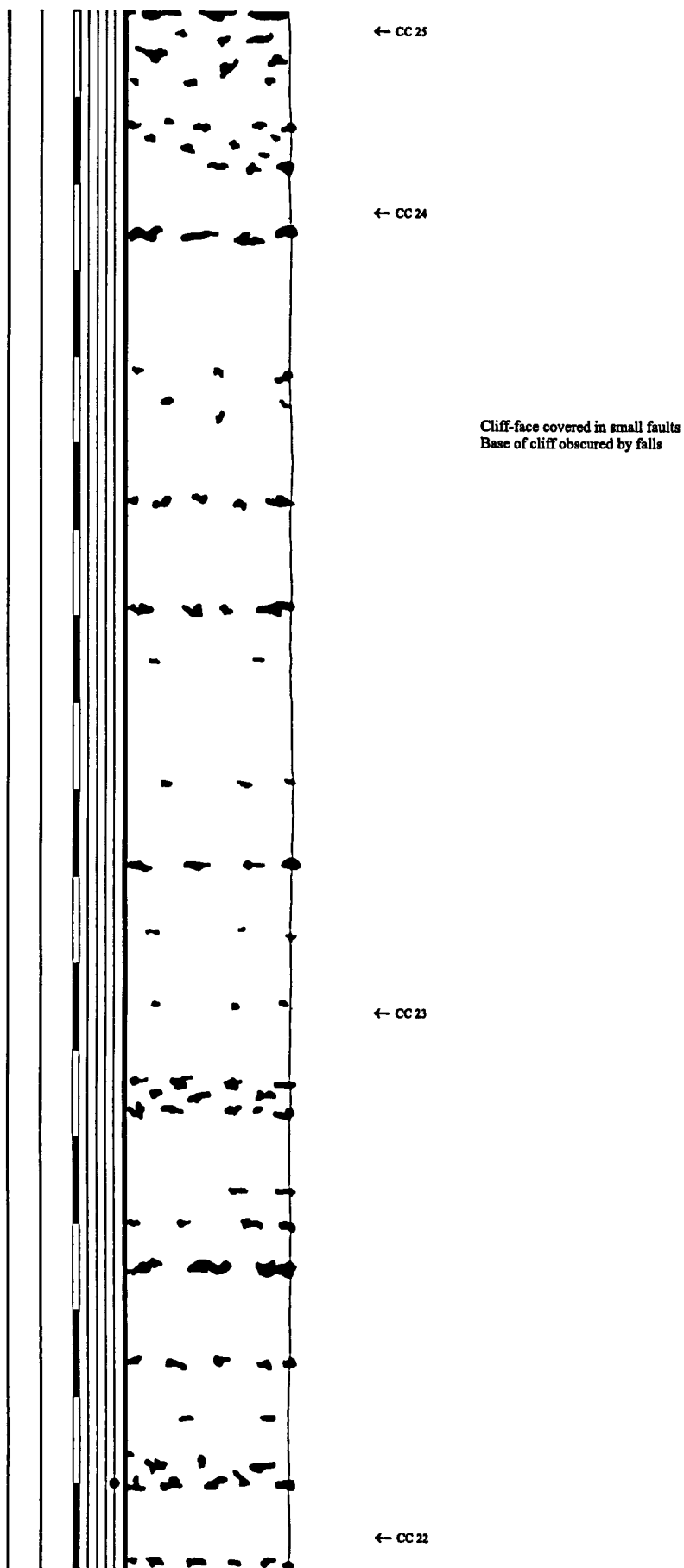


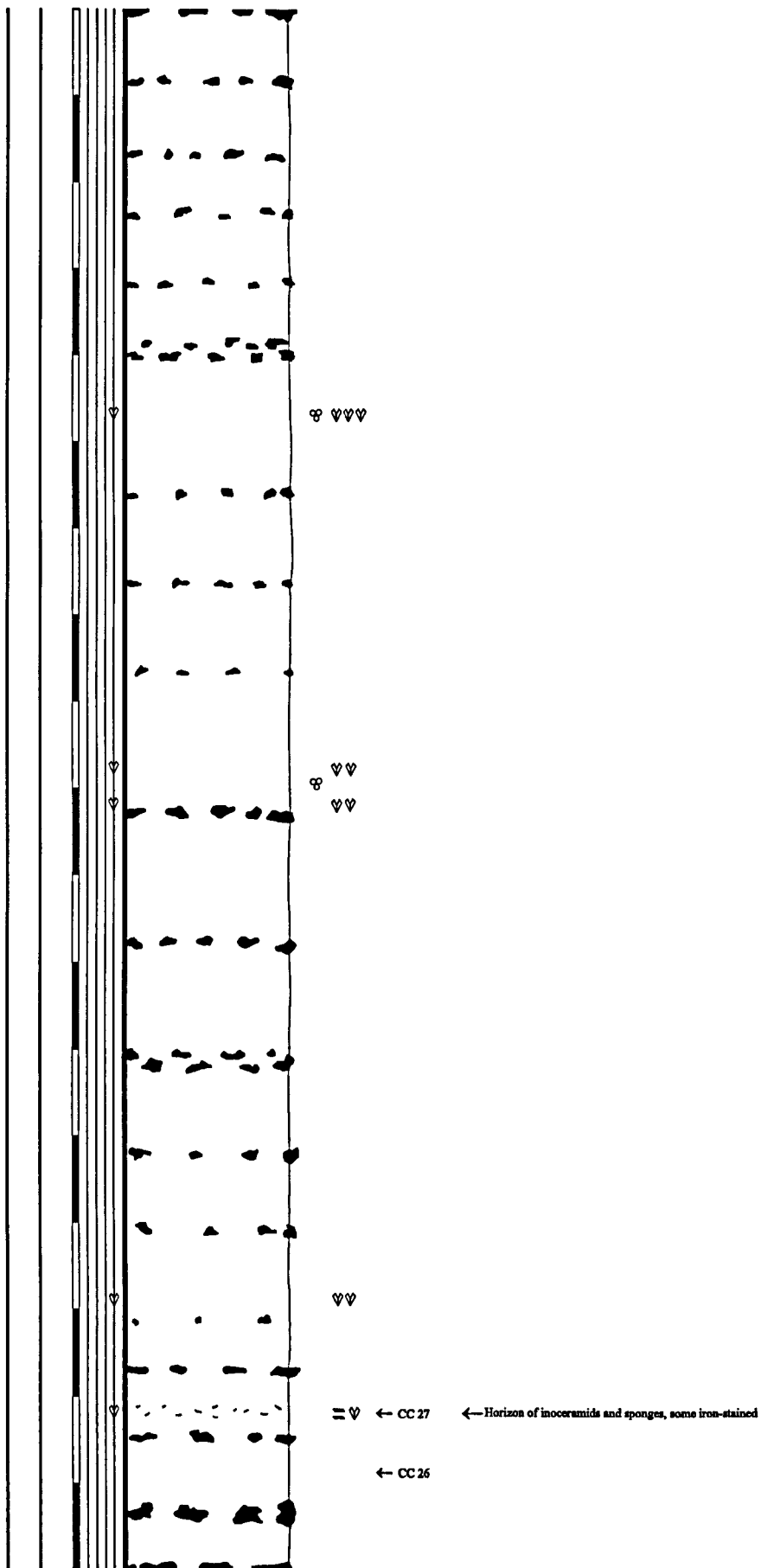


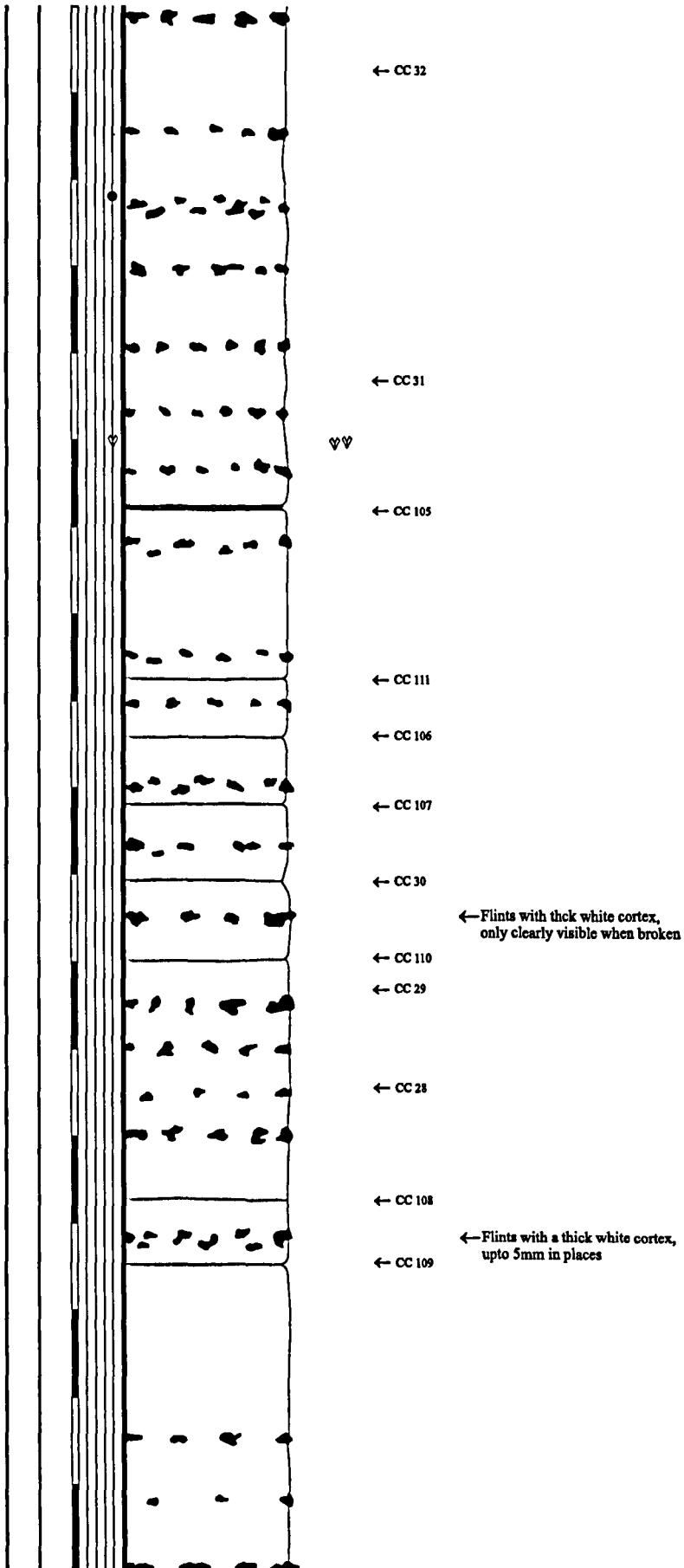
111 D

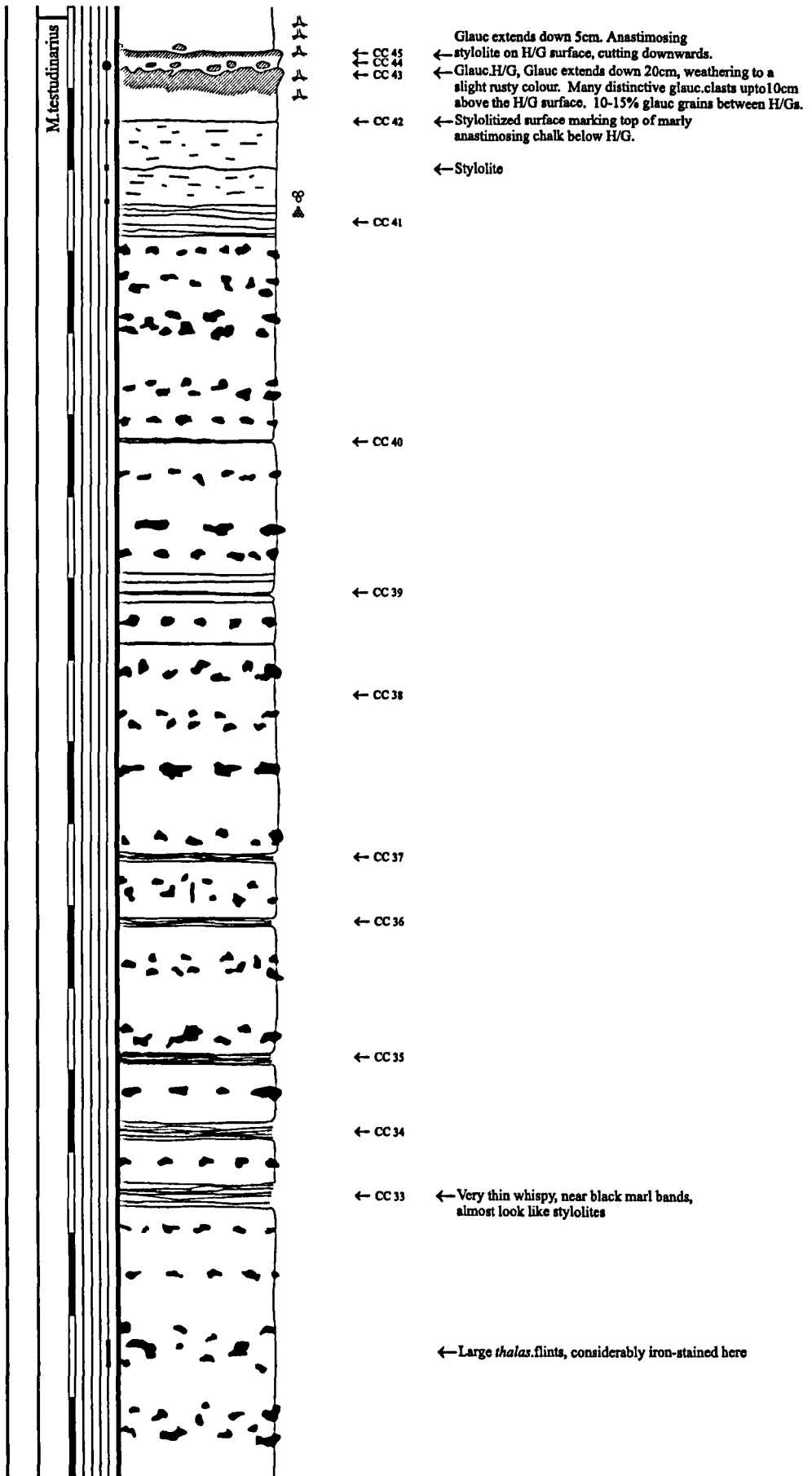


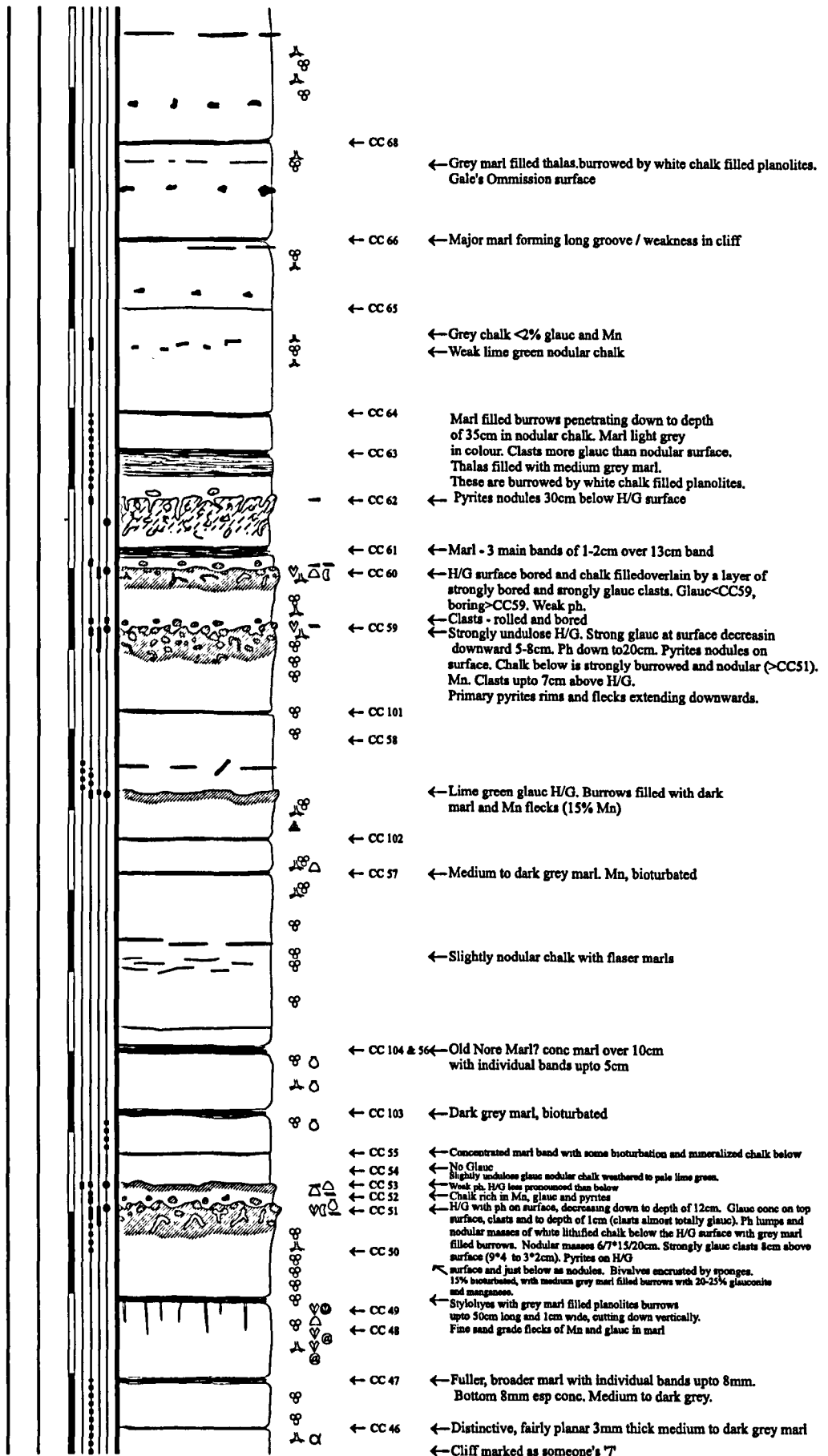


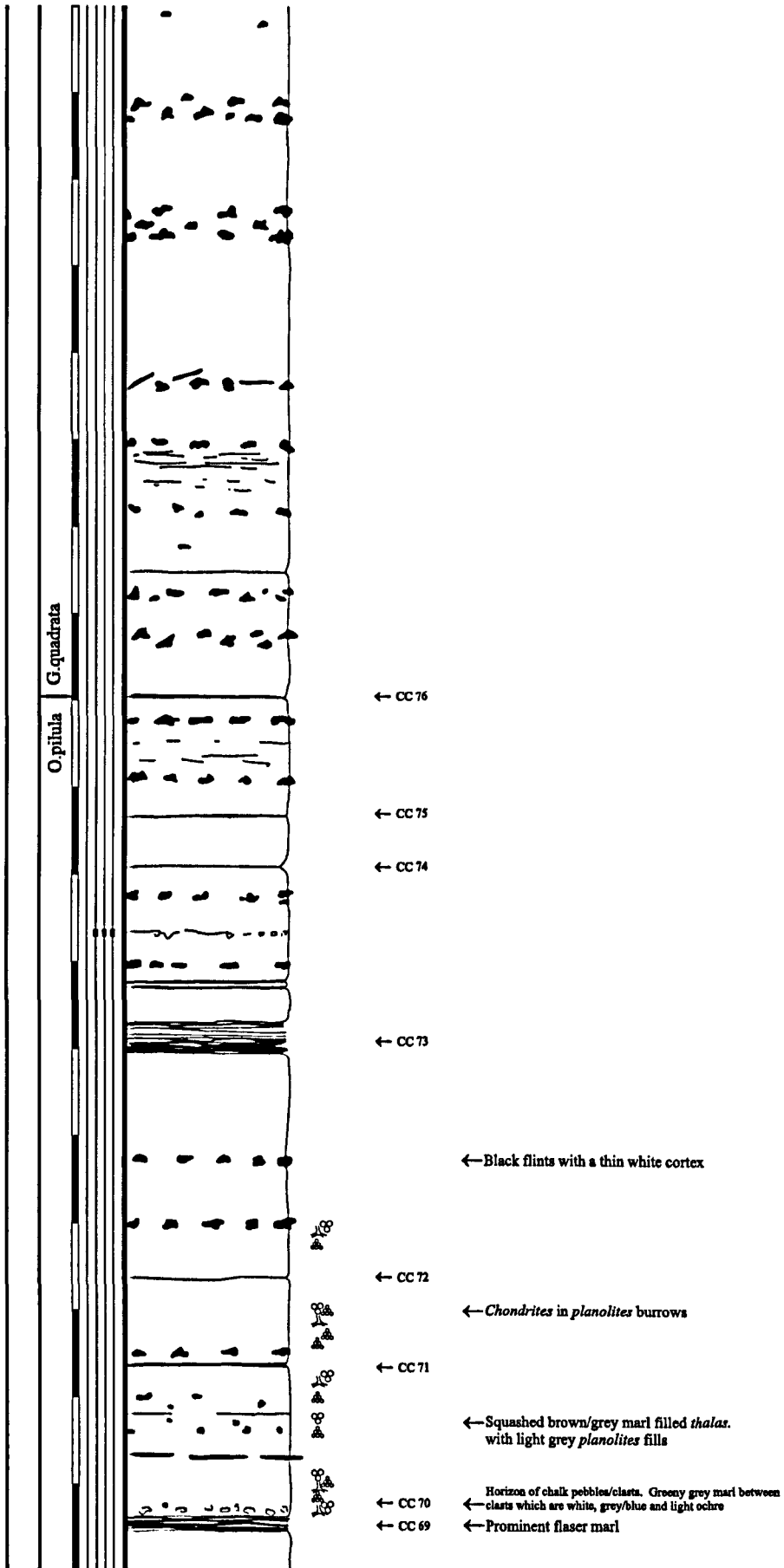


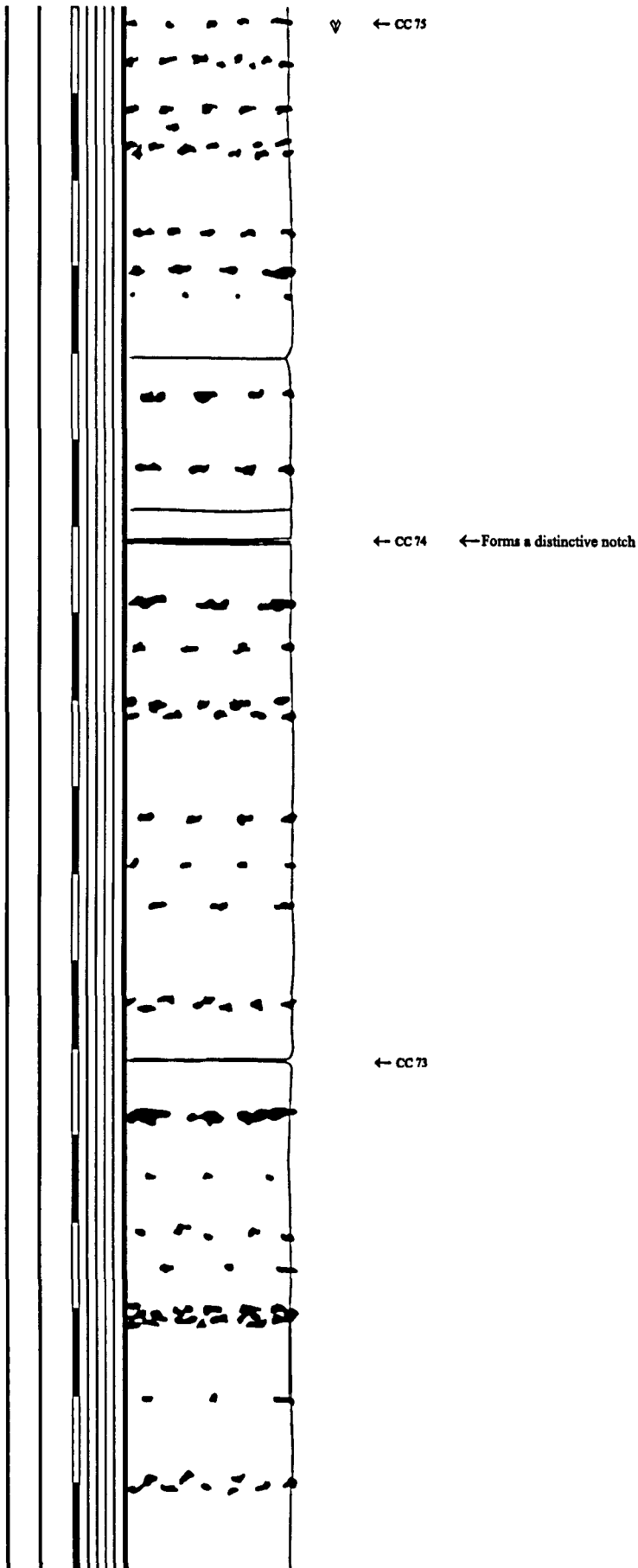


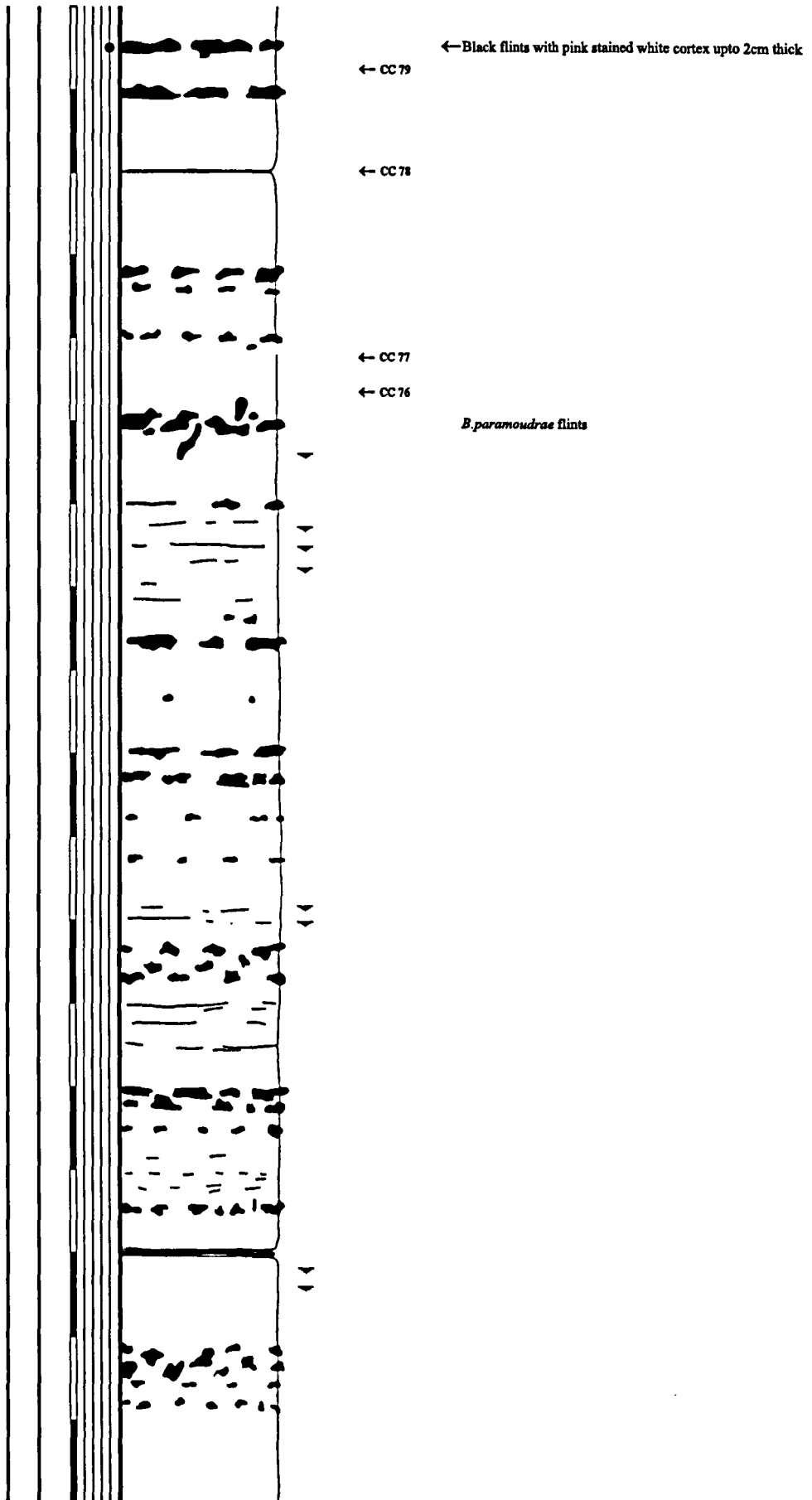


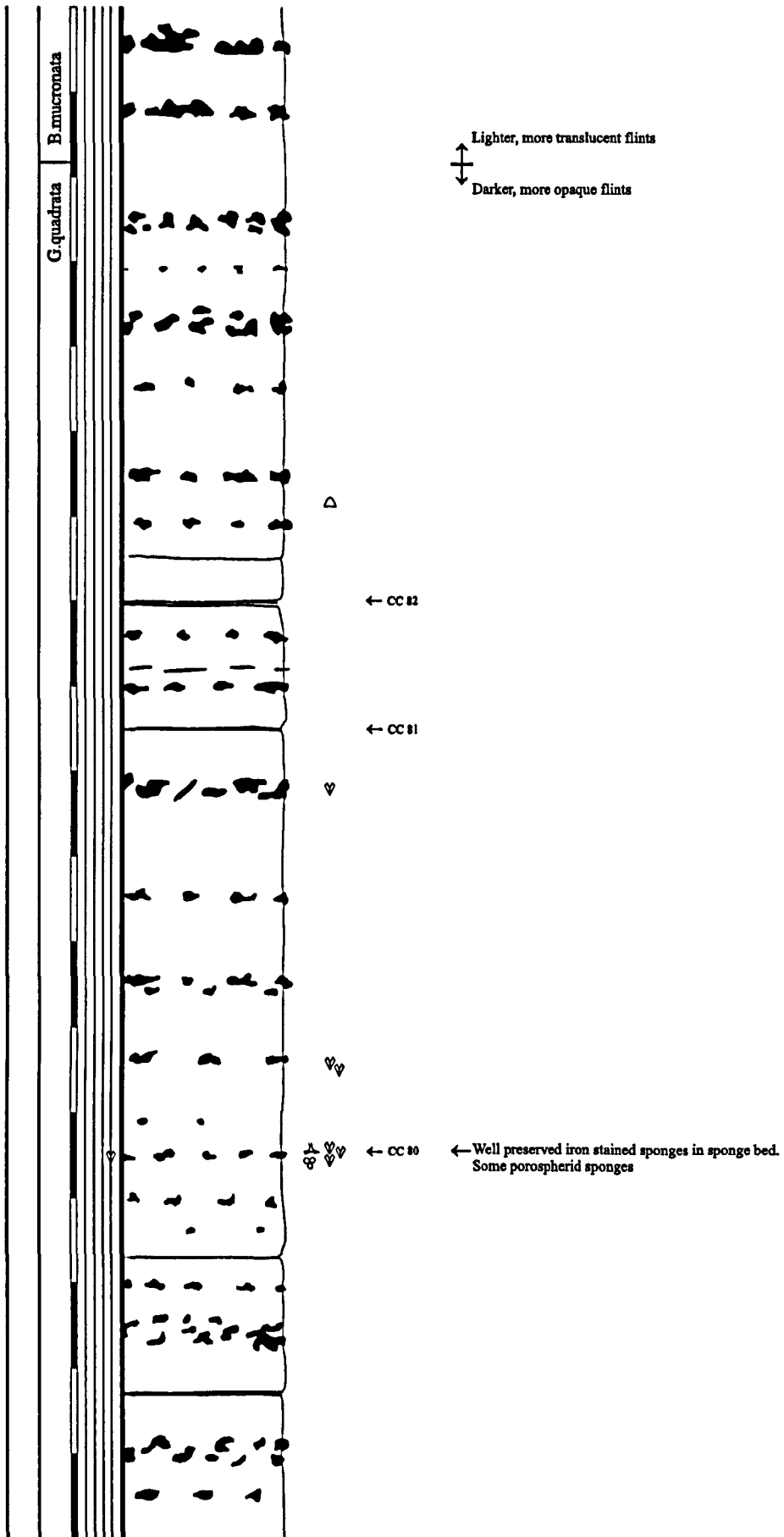


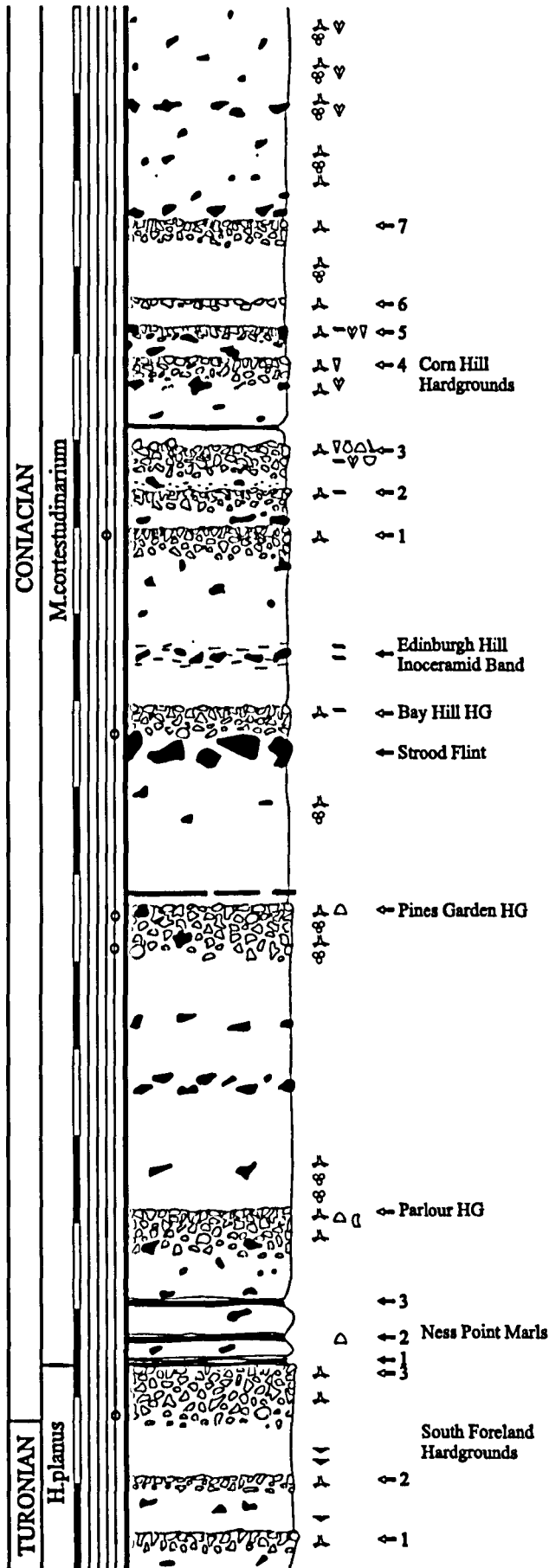


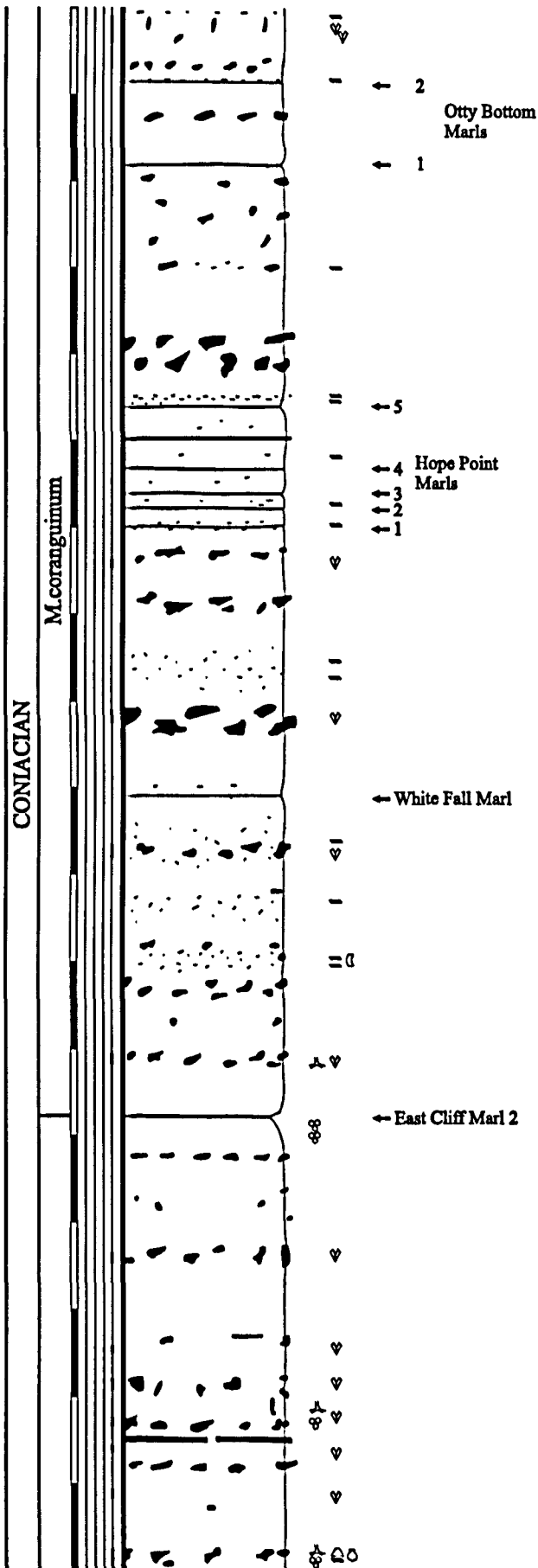


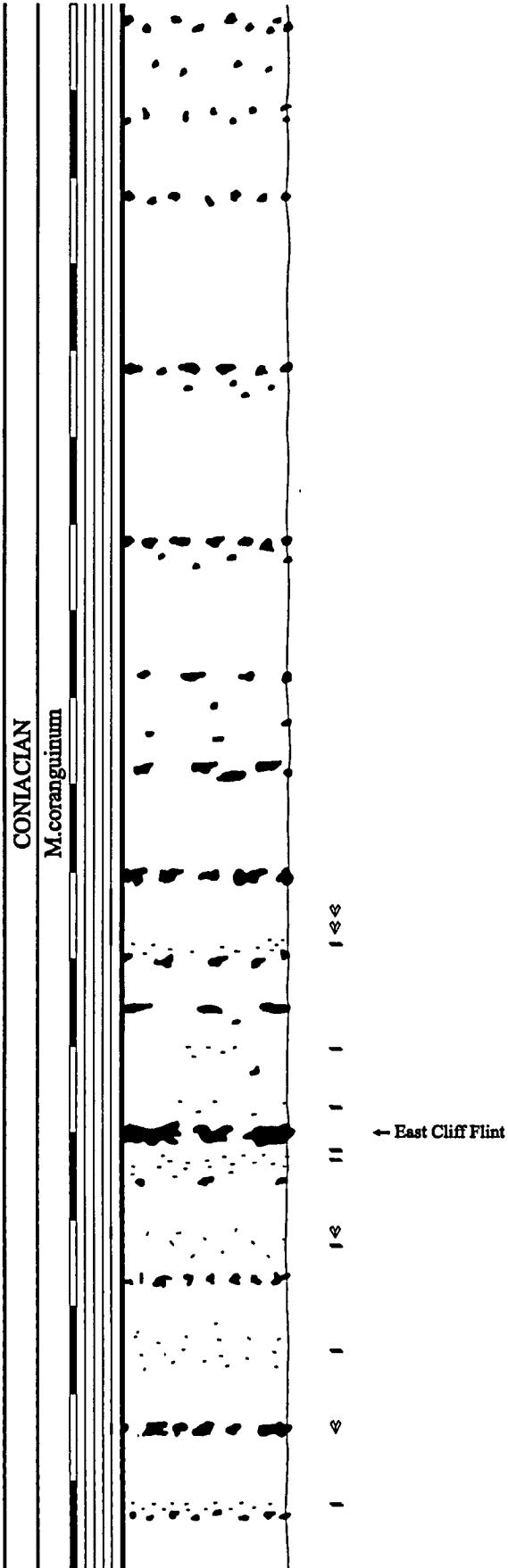


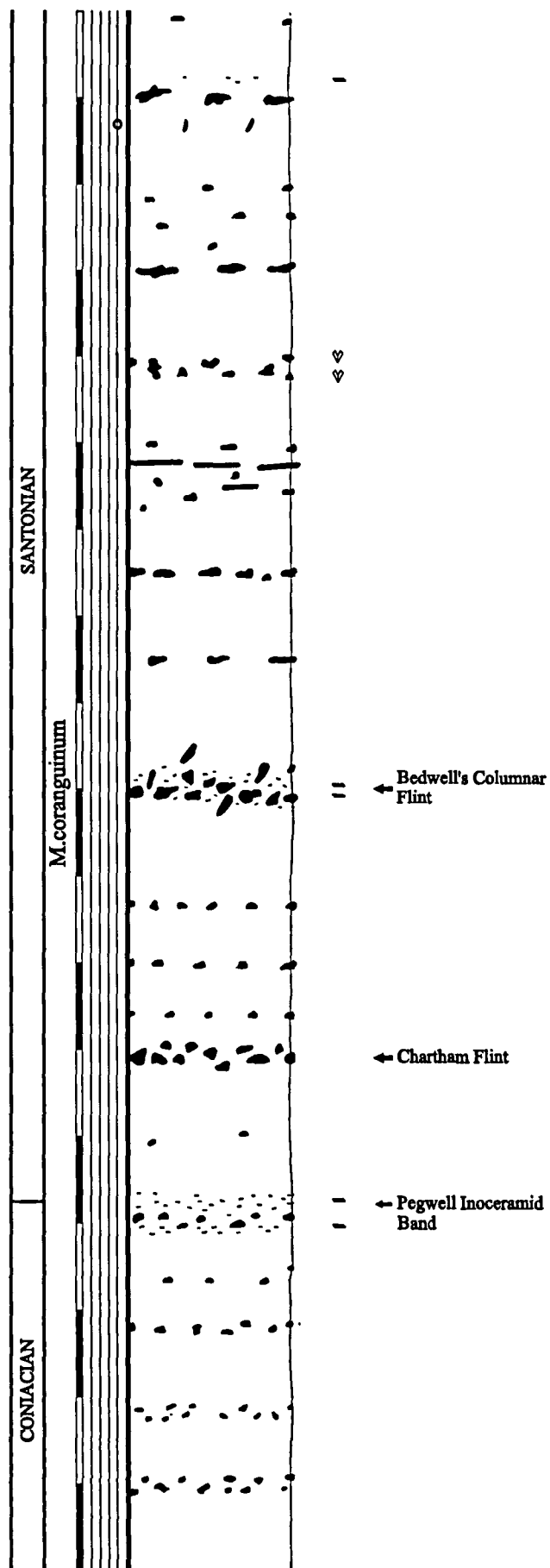


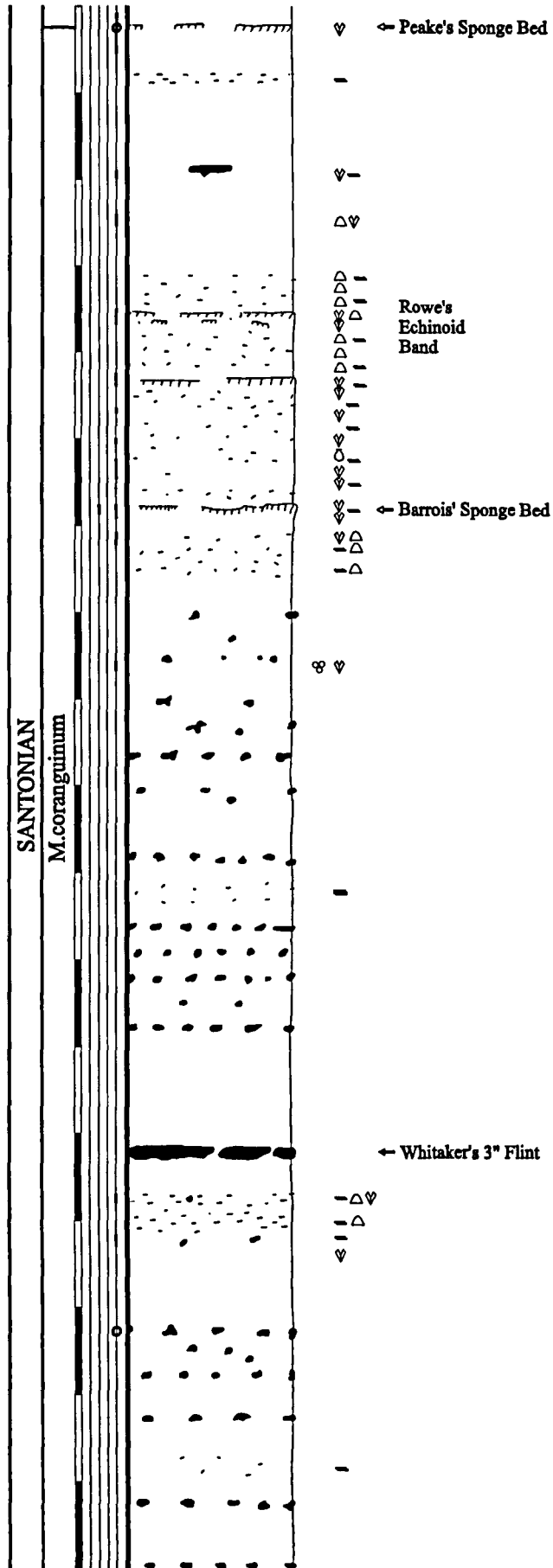


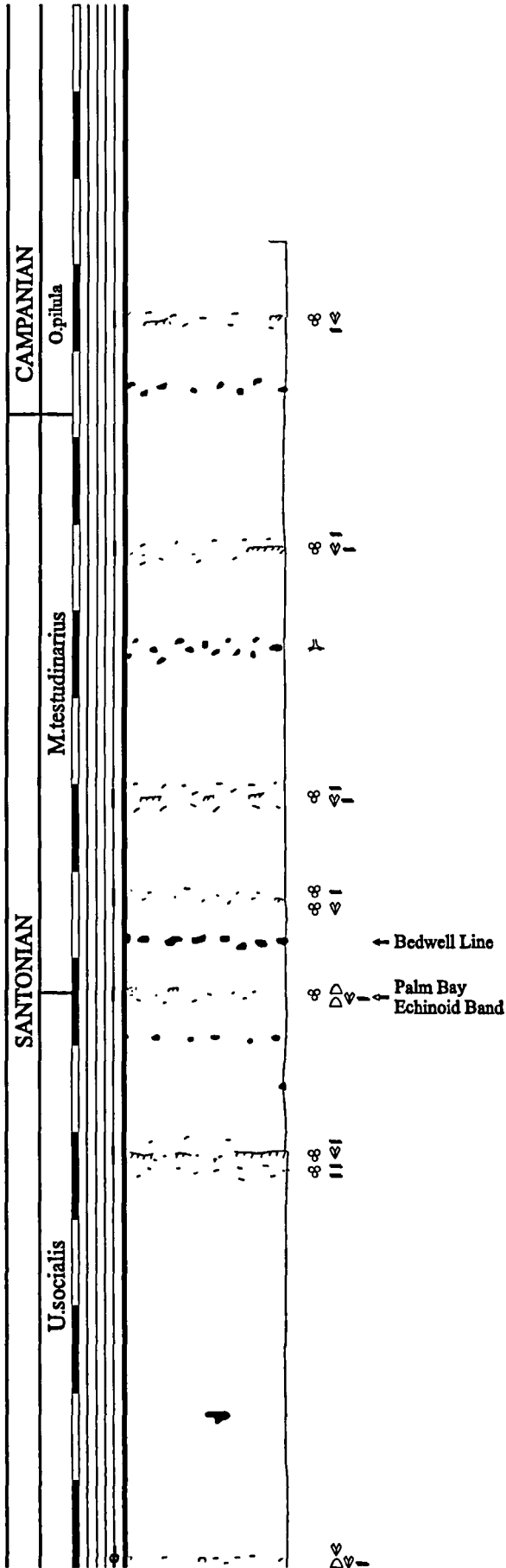


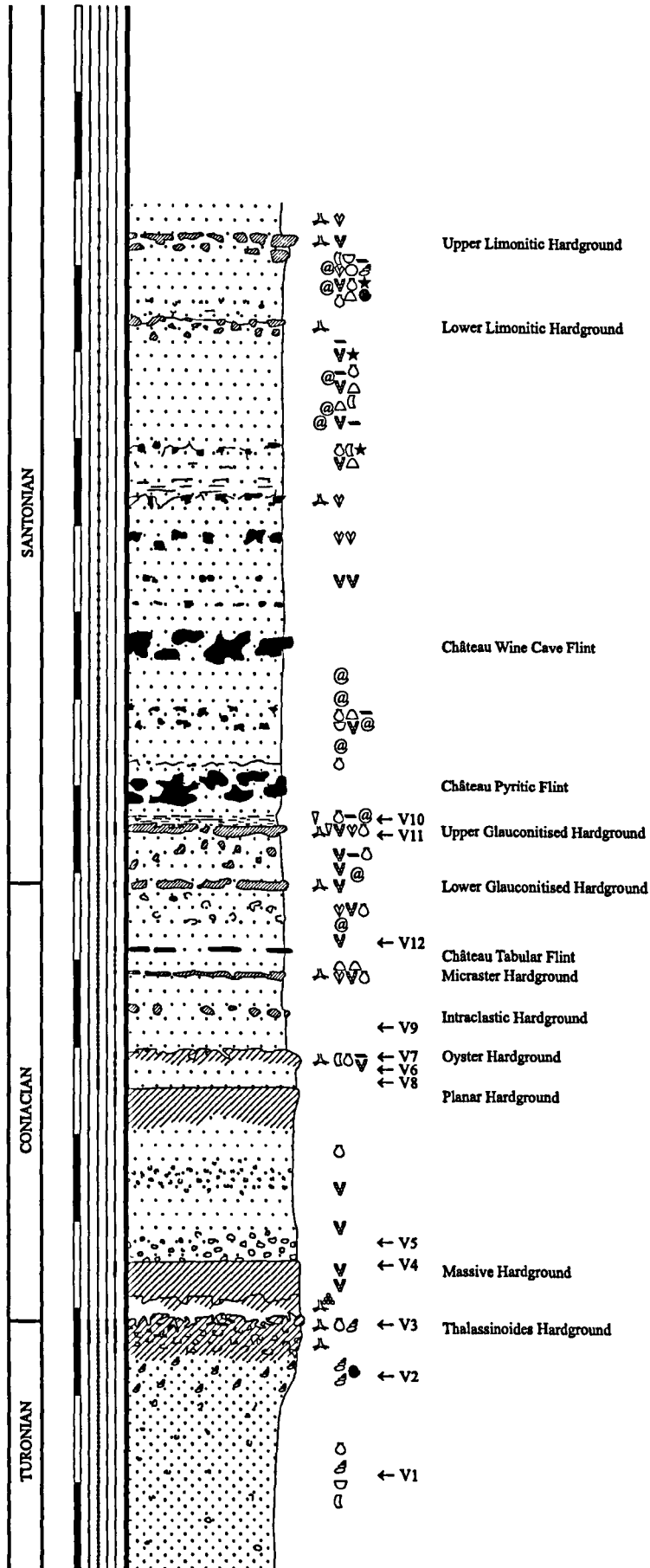


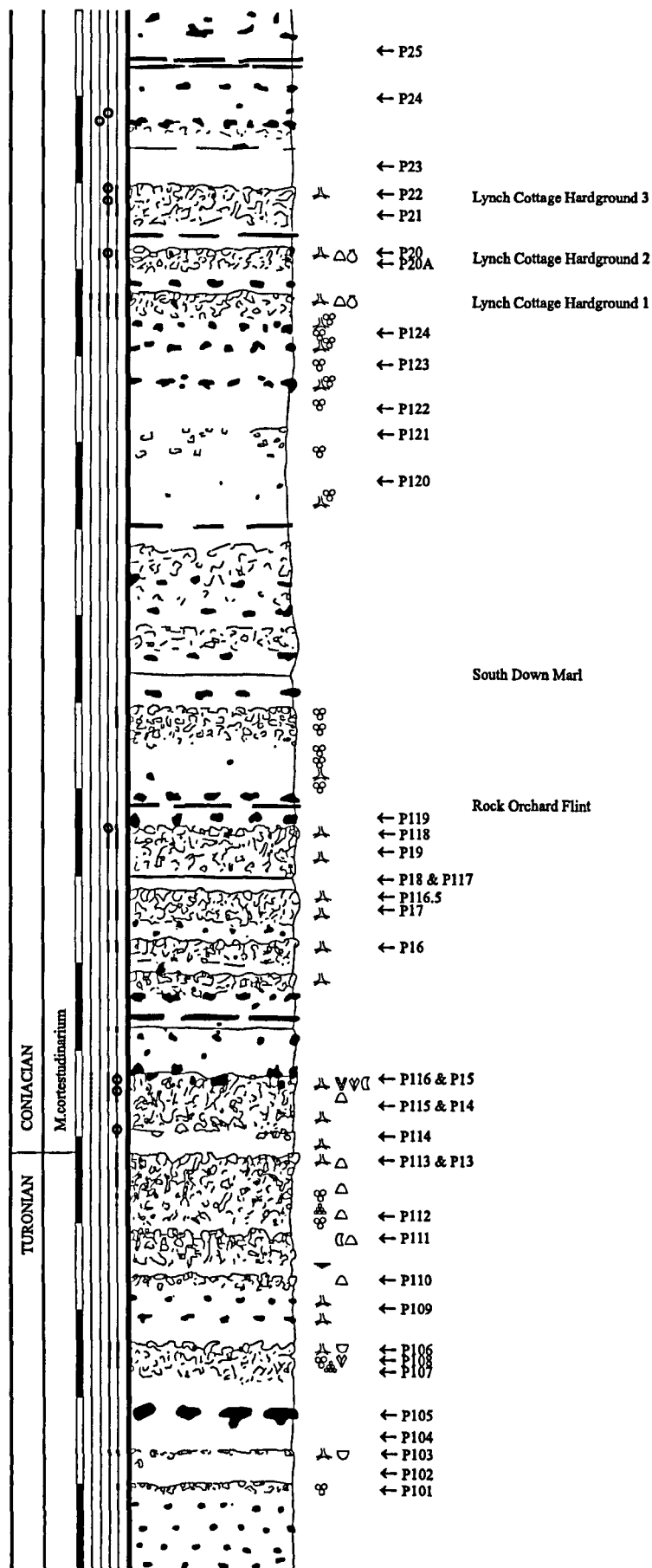


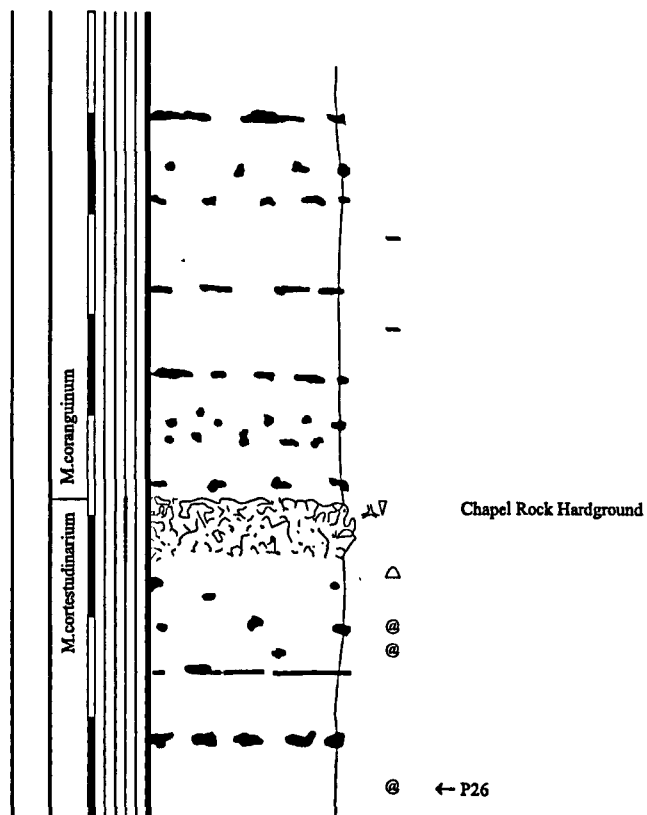


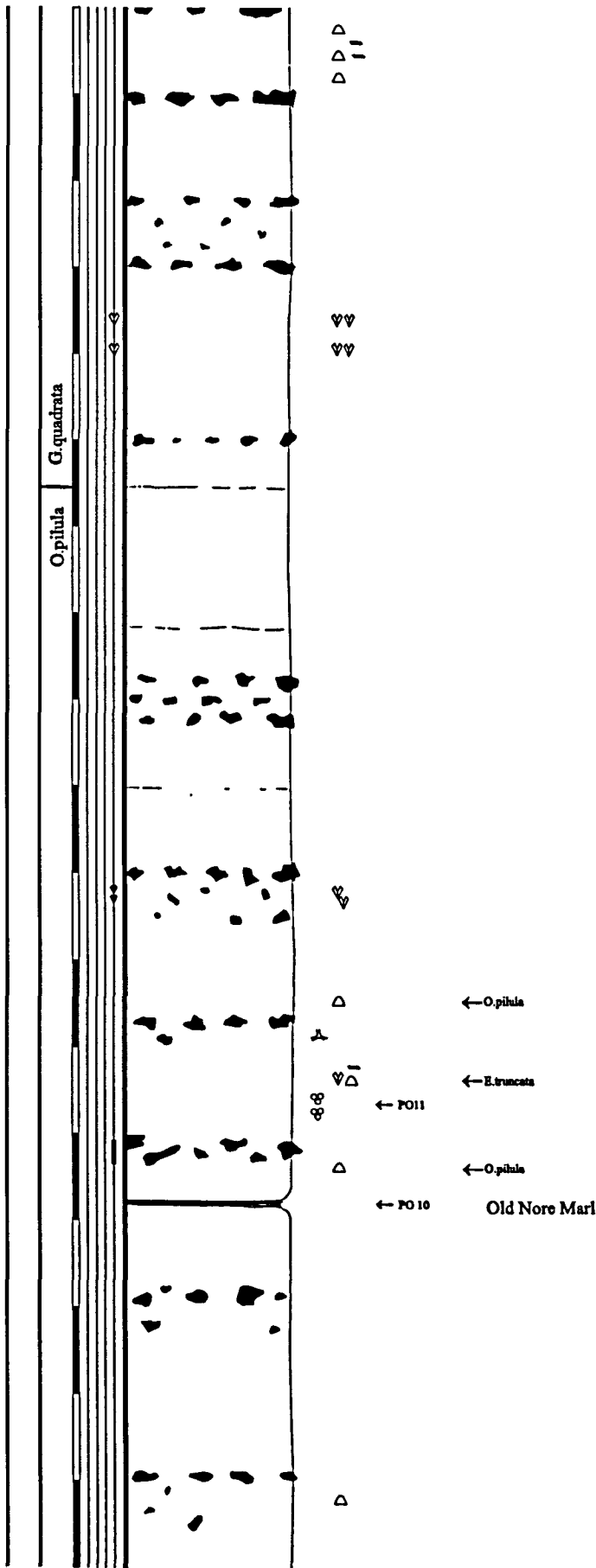


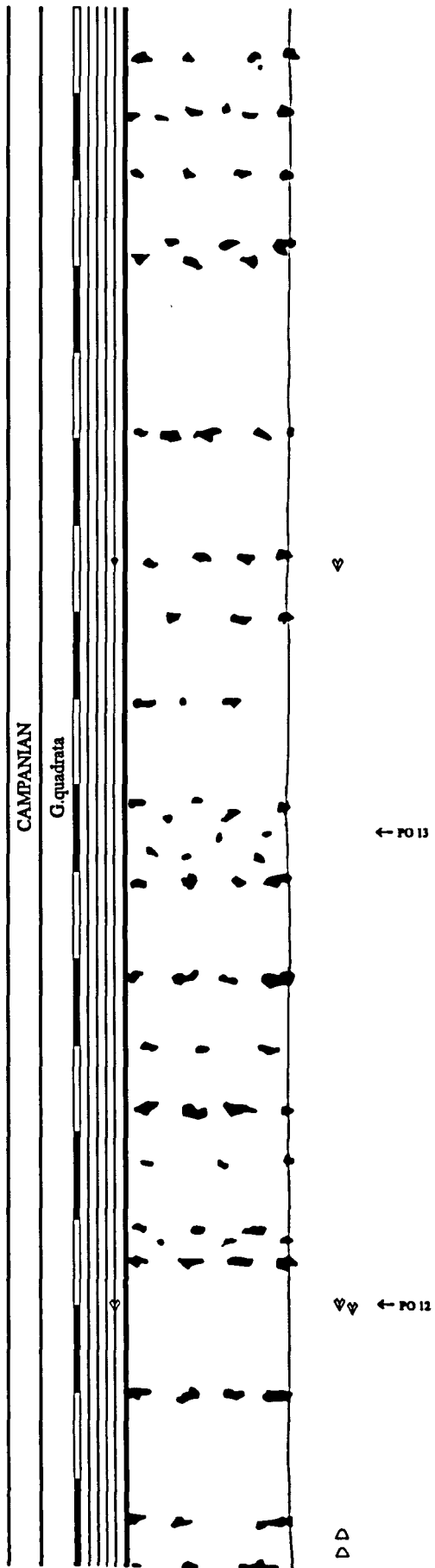


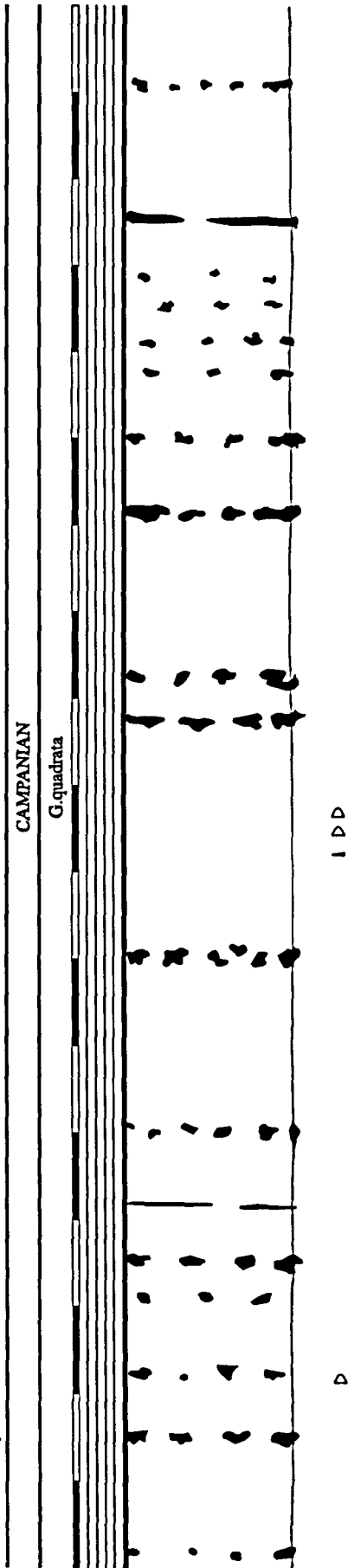


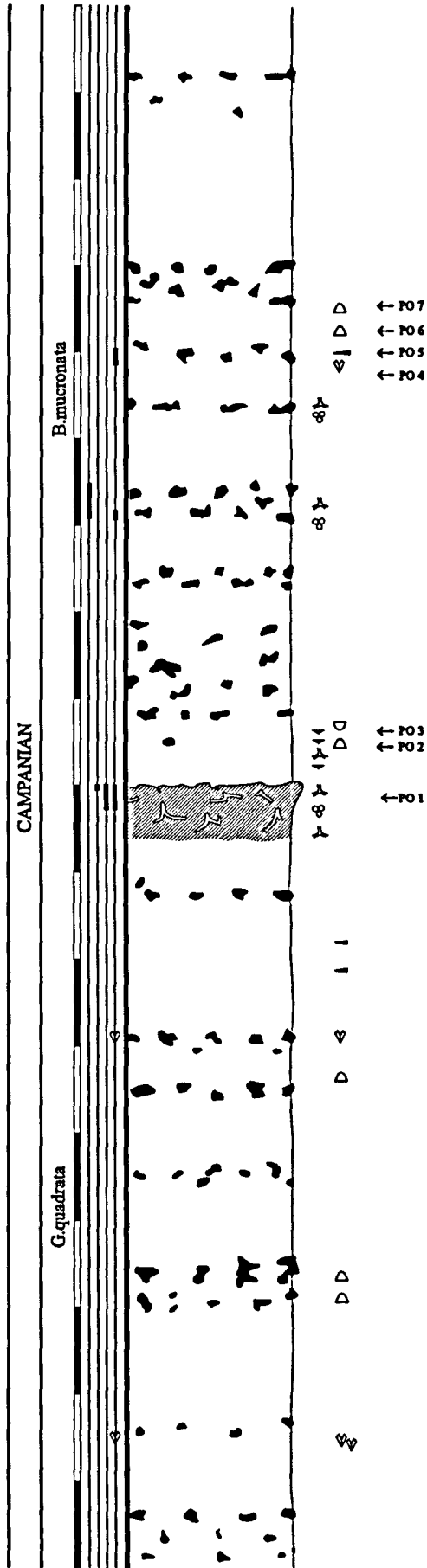


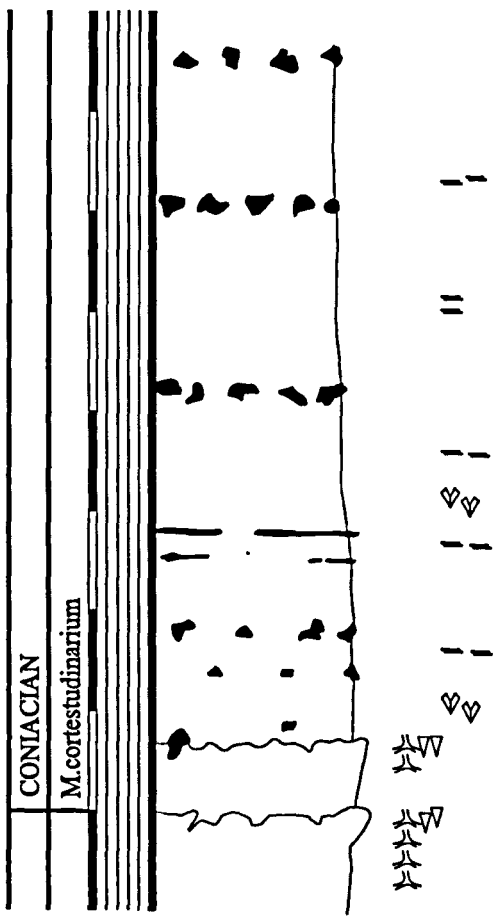


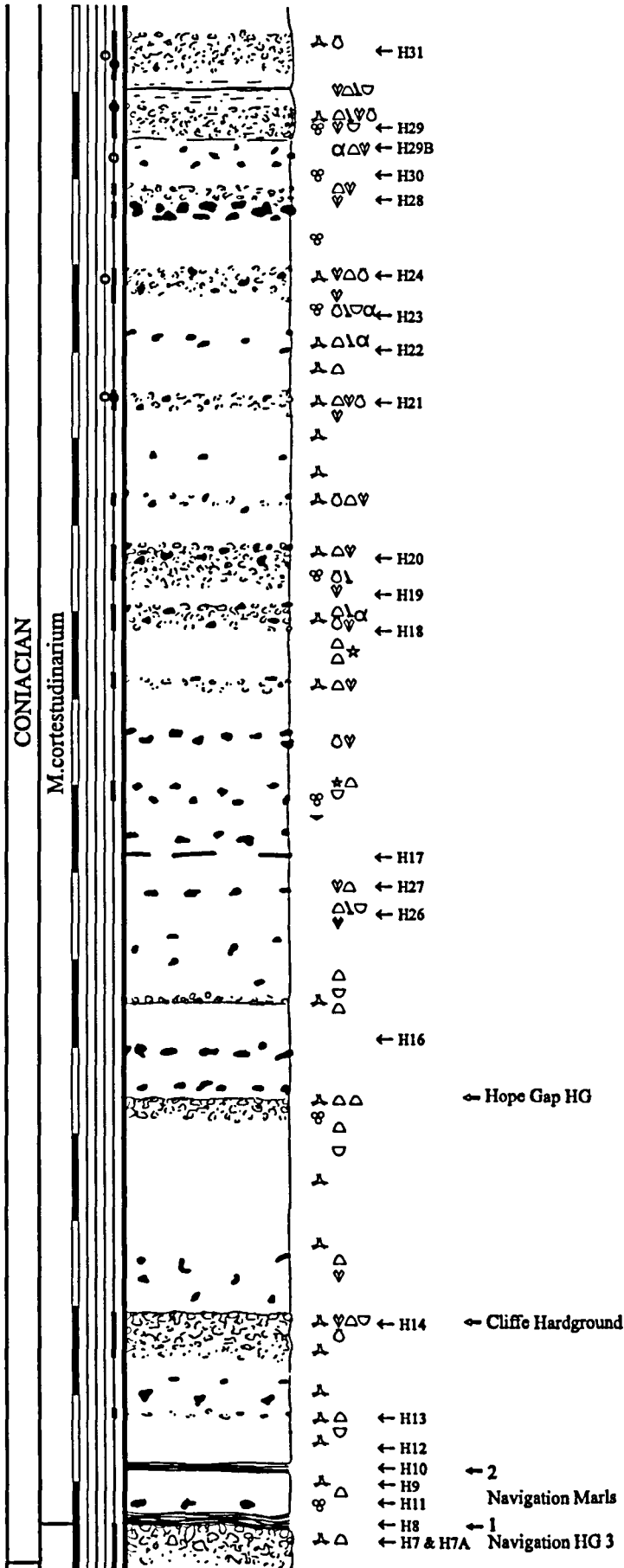


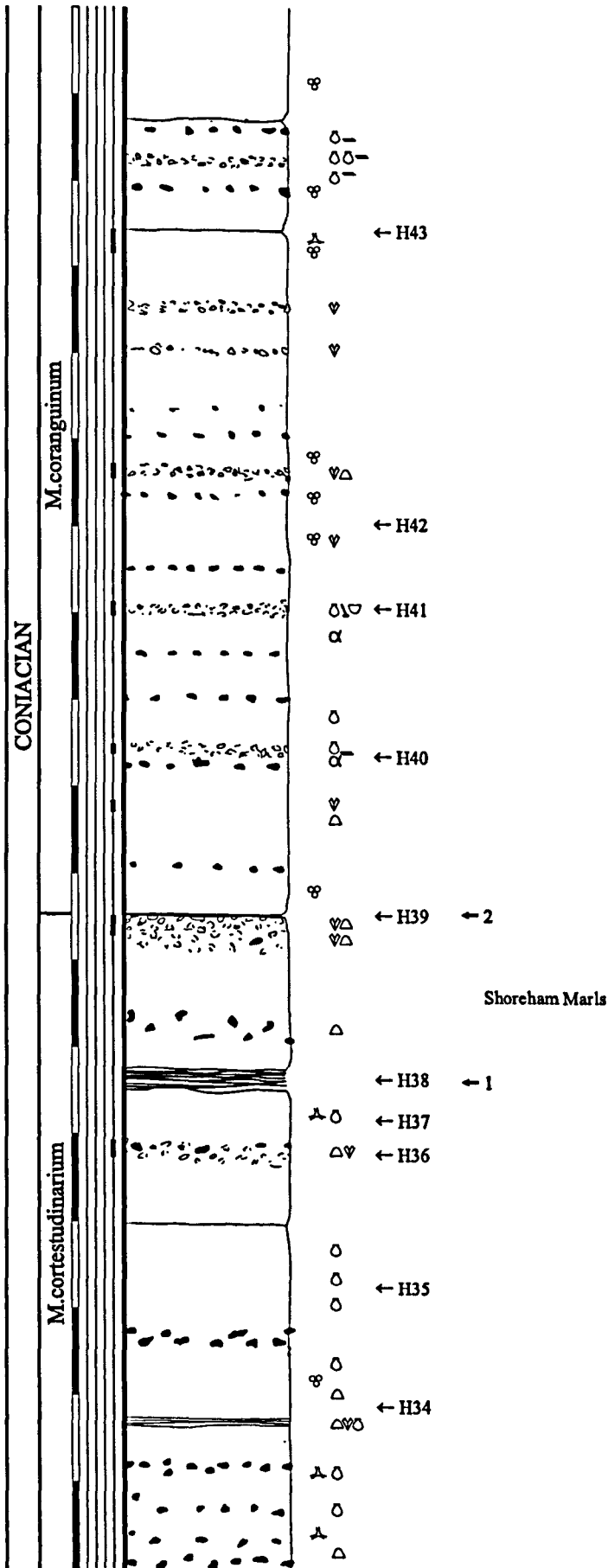


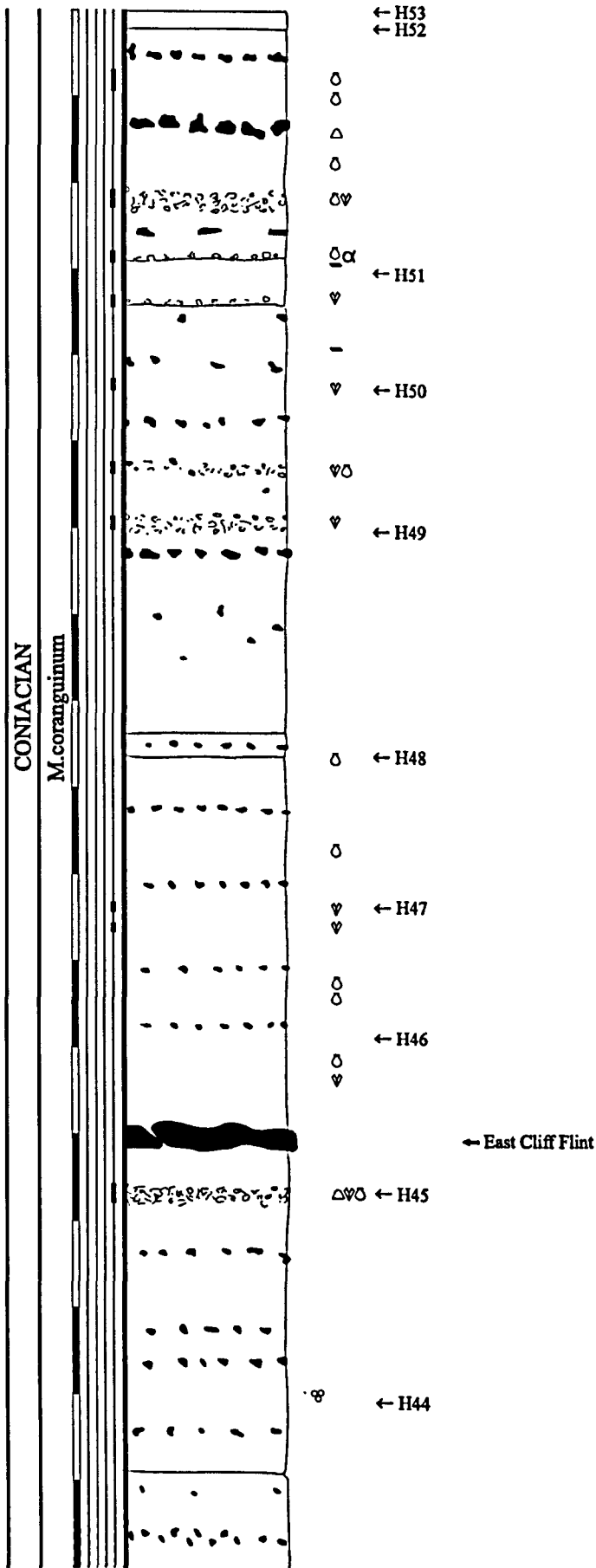


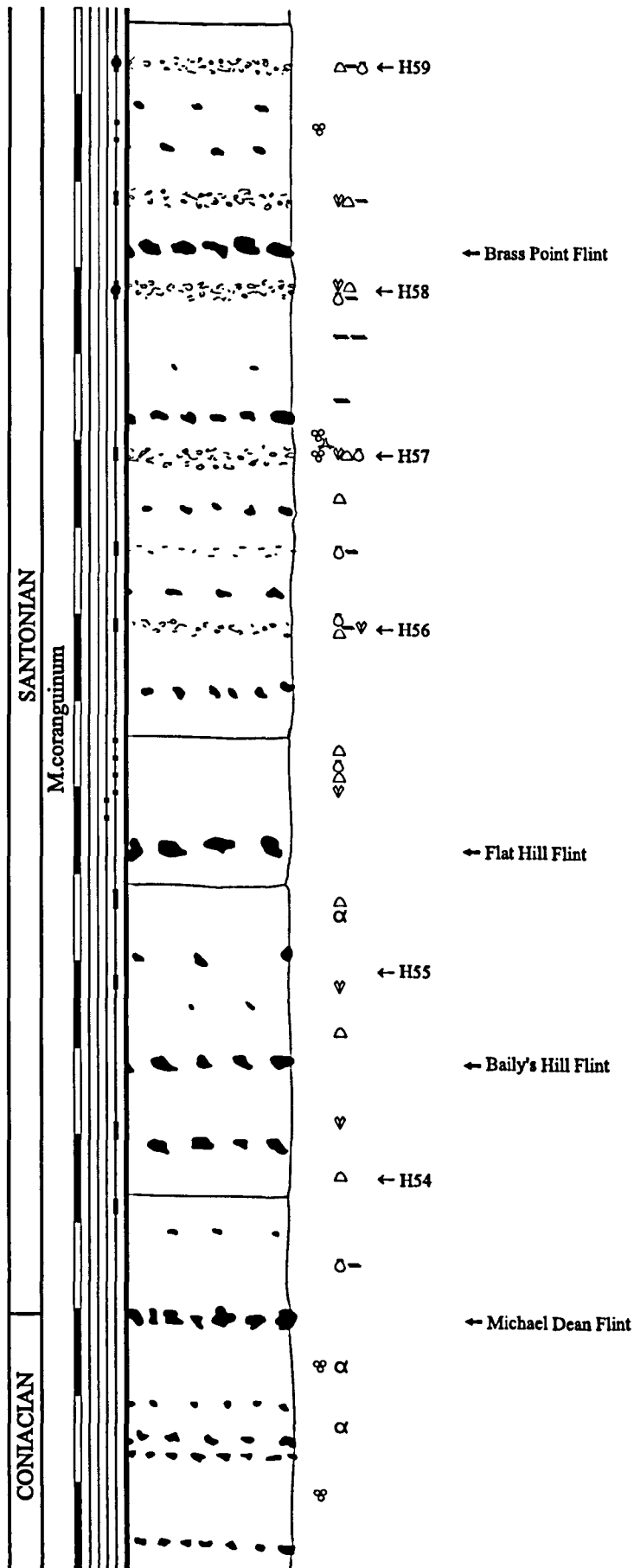


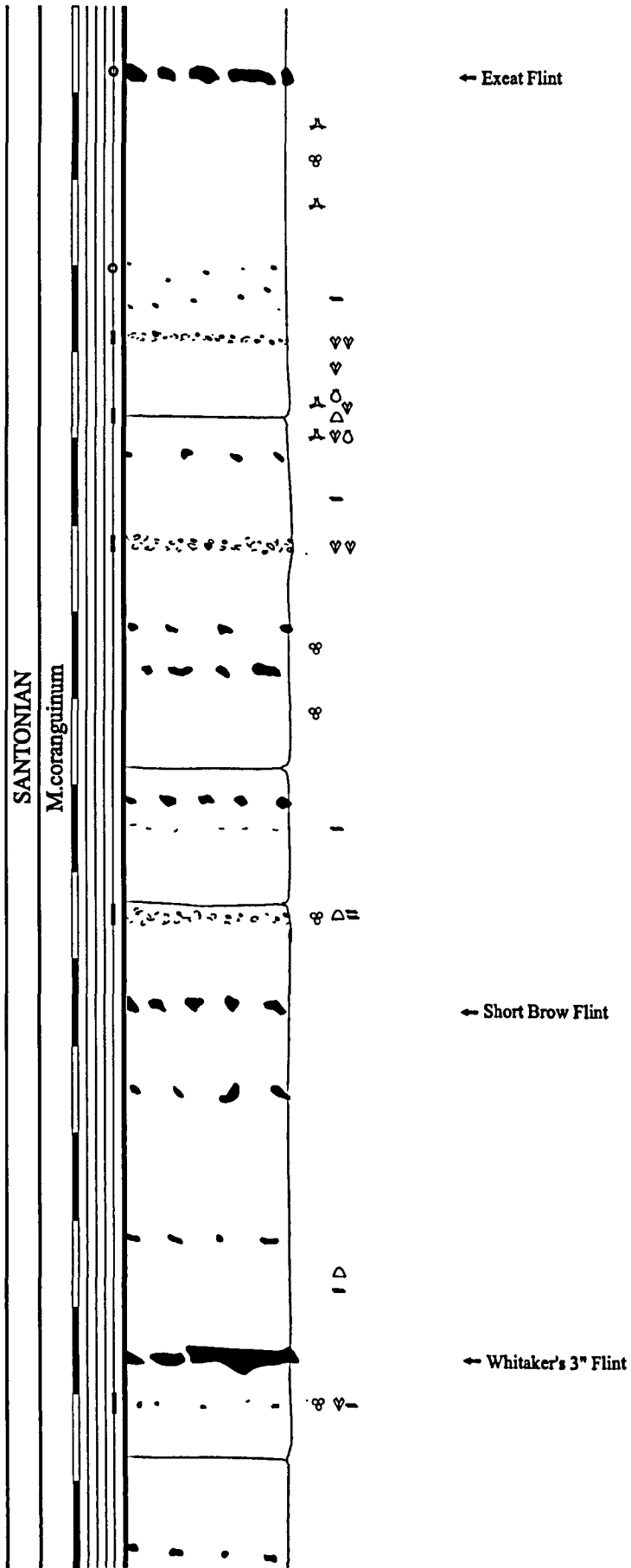


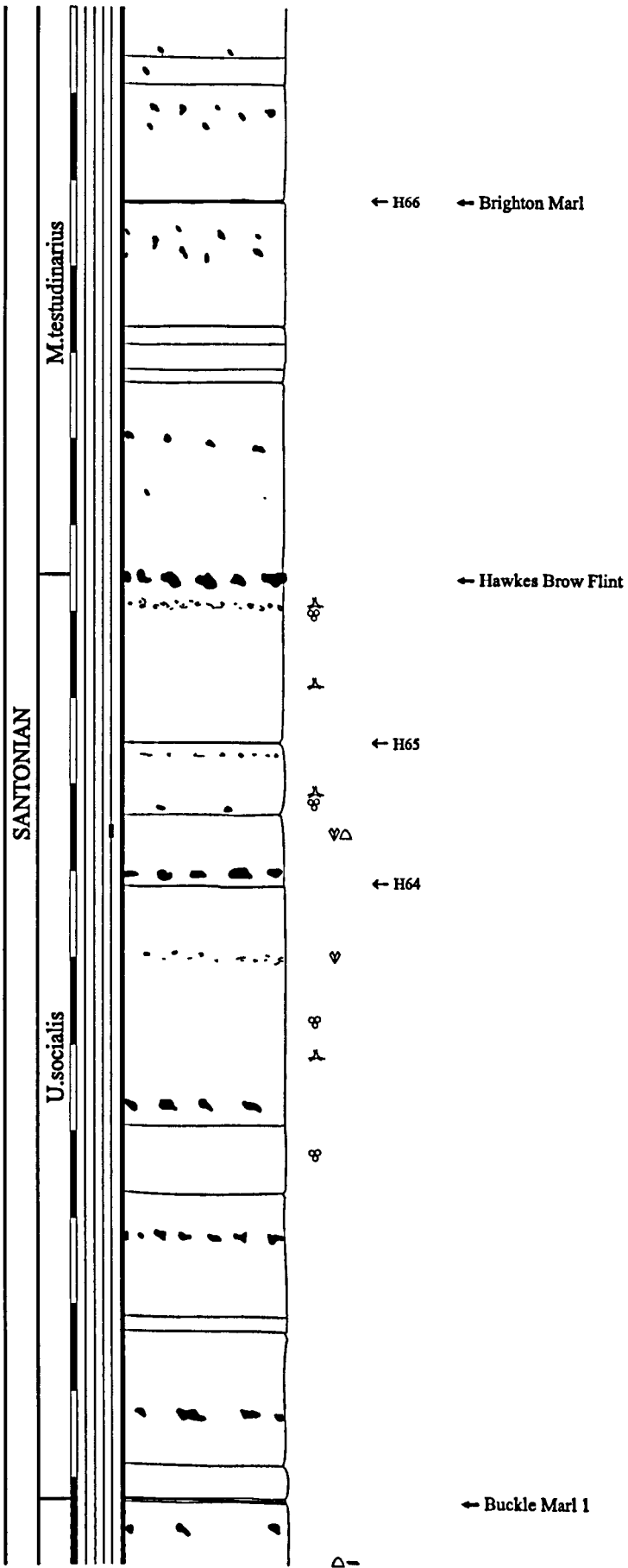


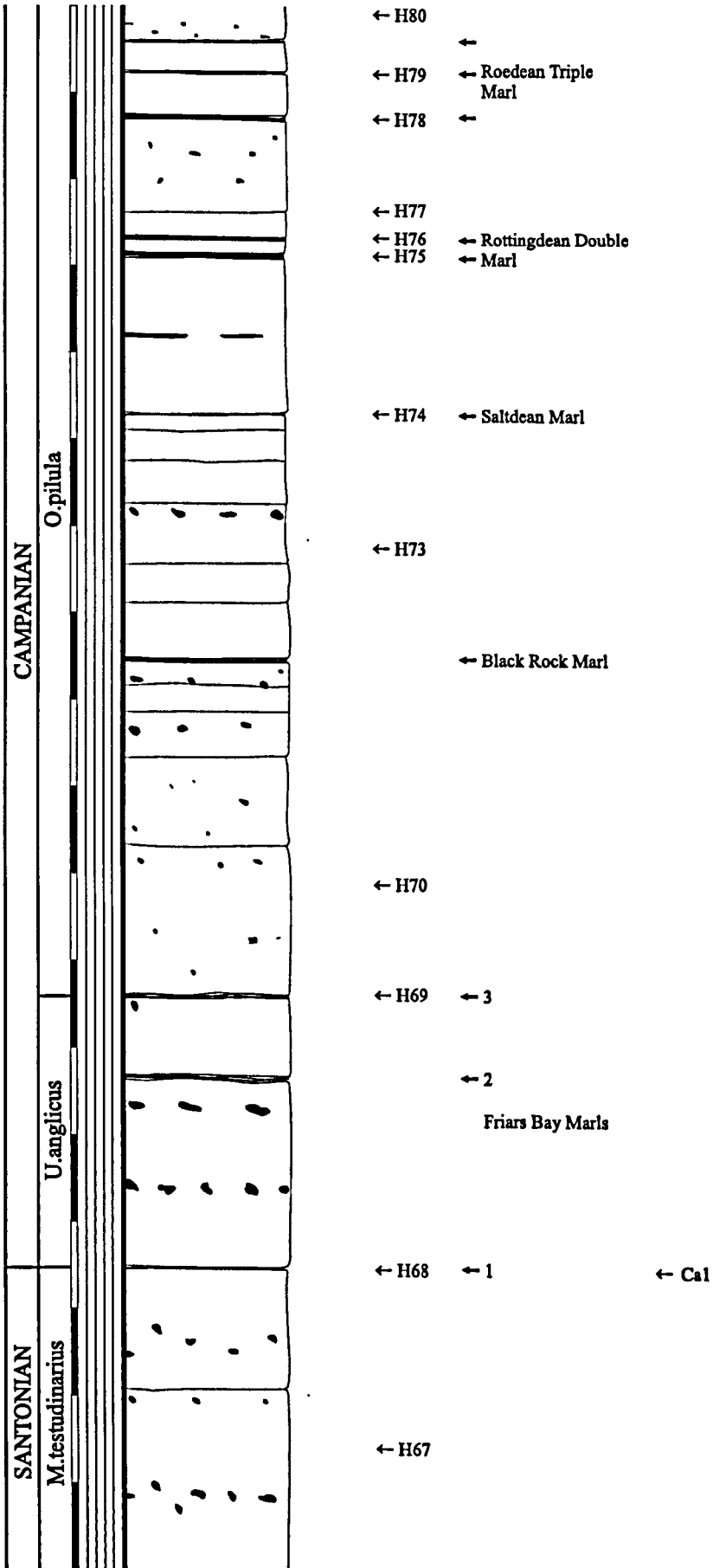


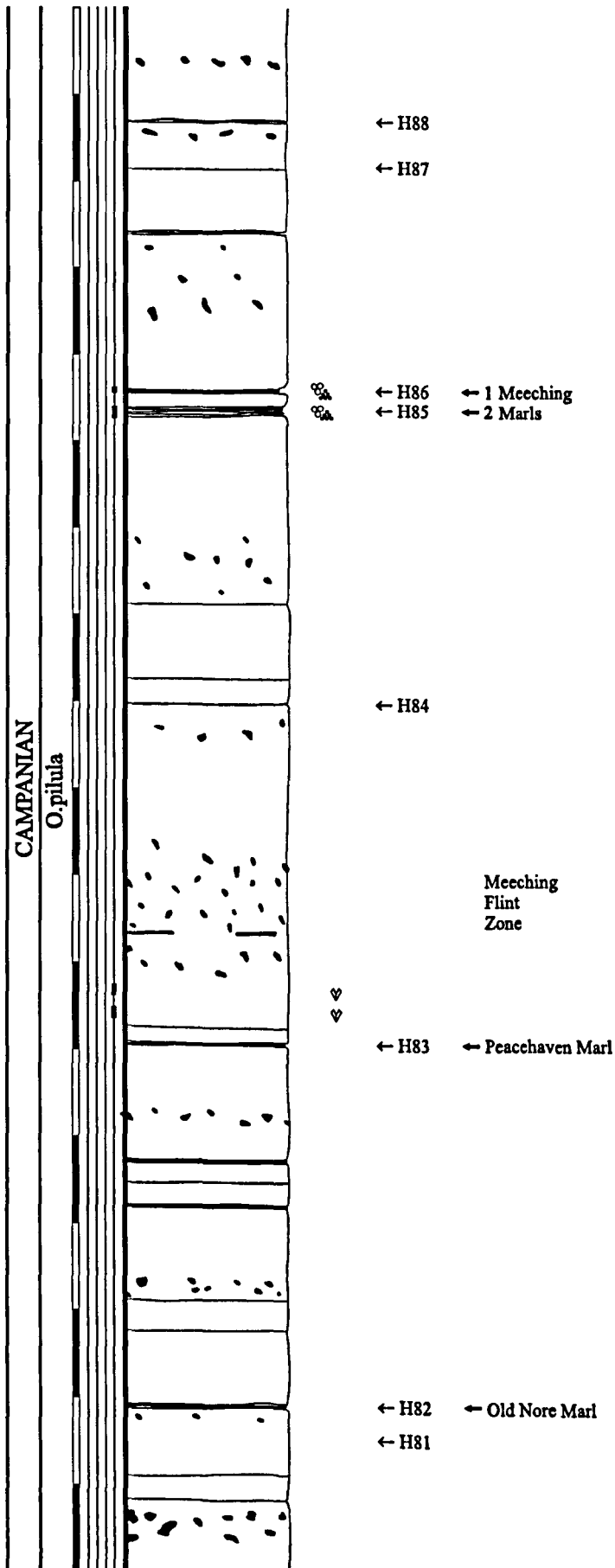


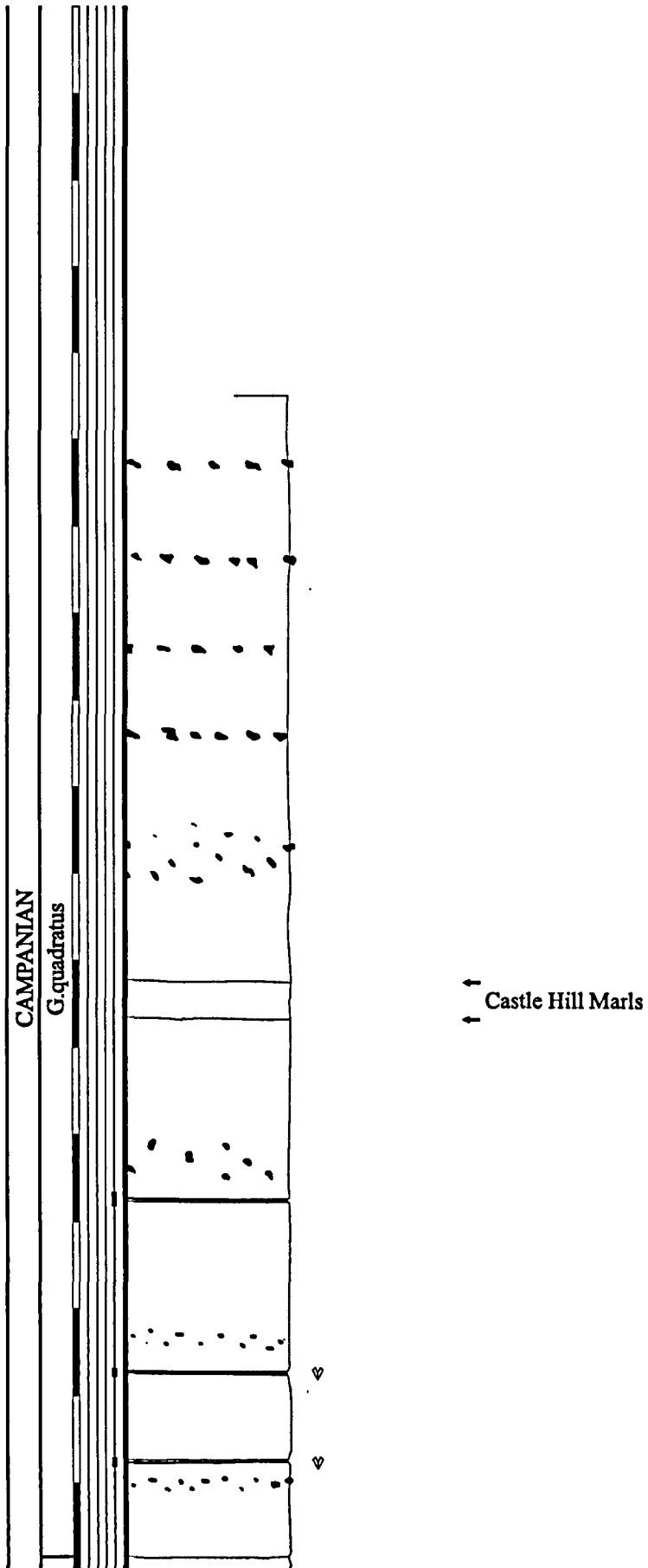


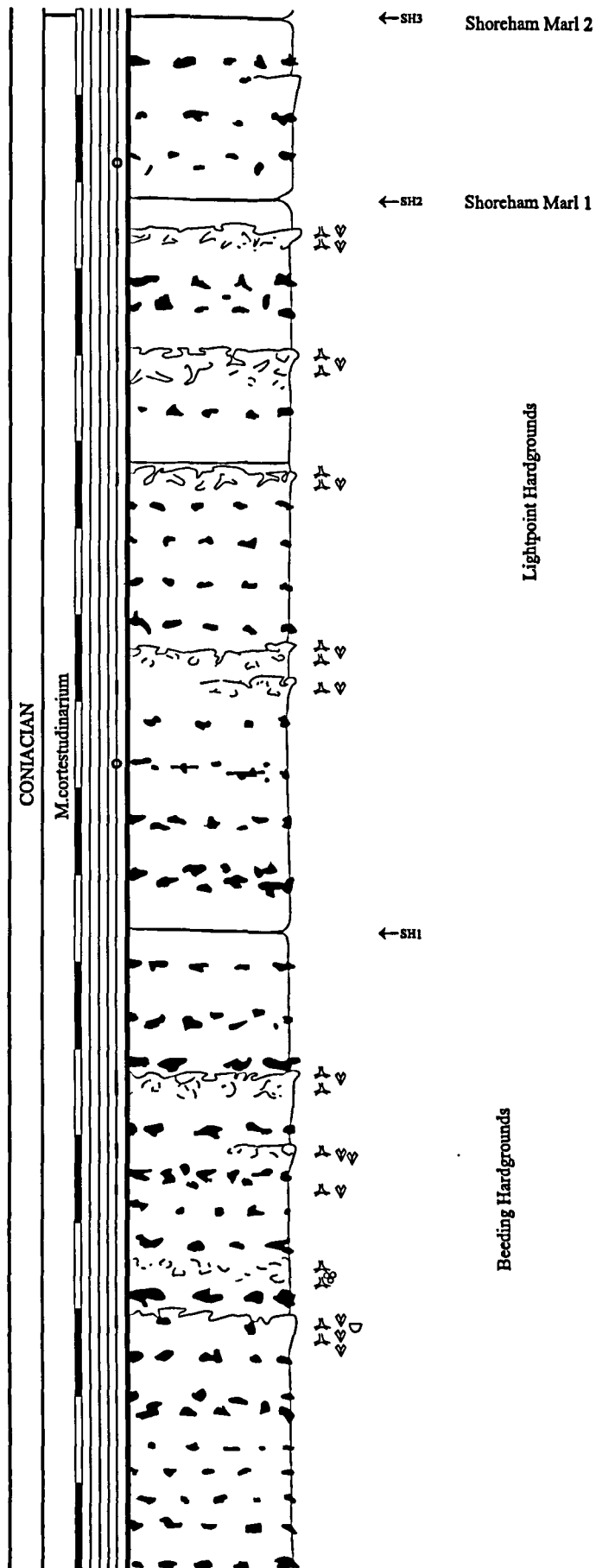


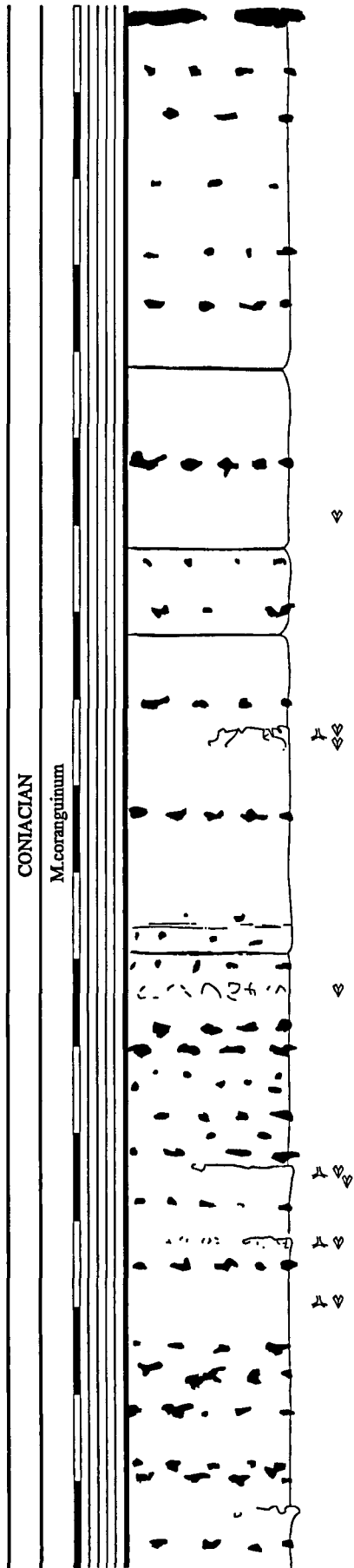










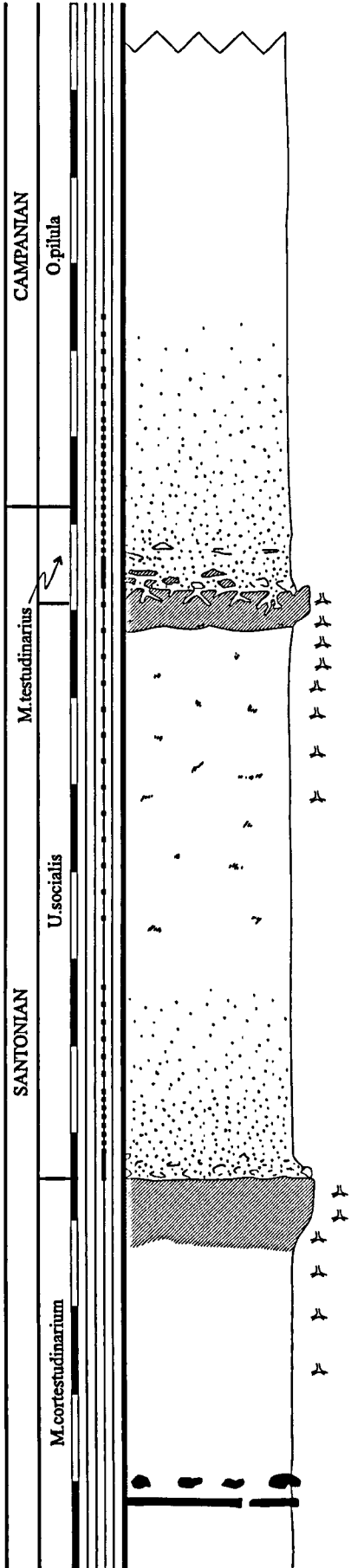


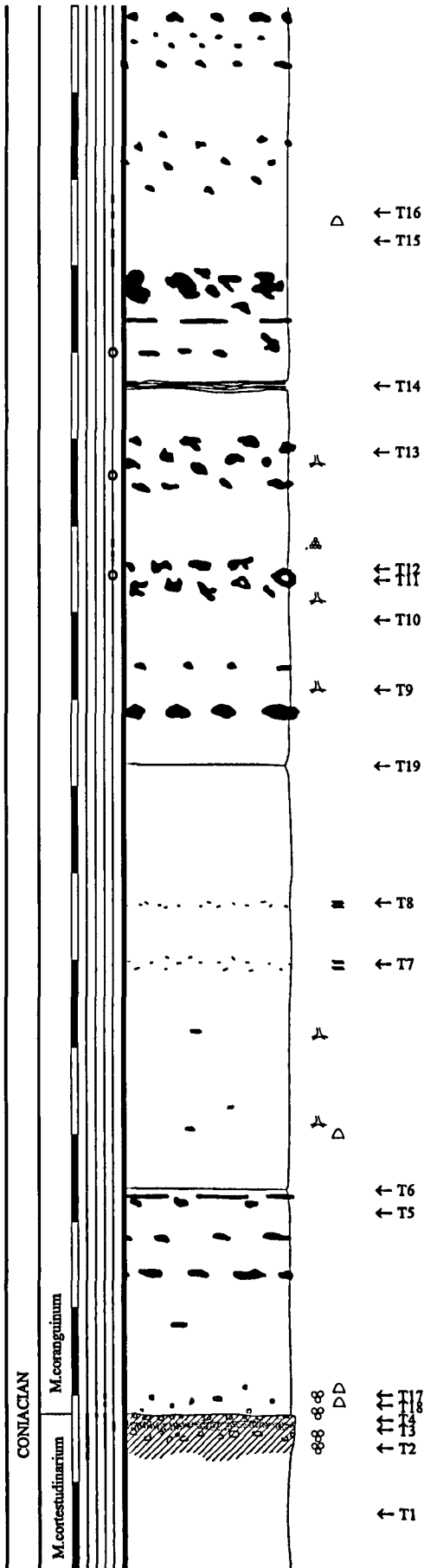
Seven Sisters' Flint

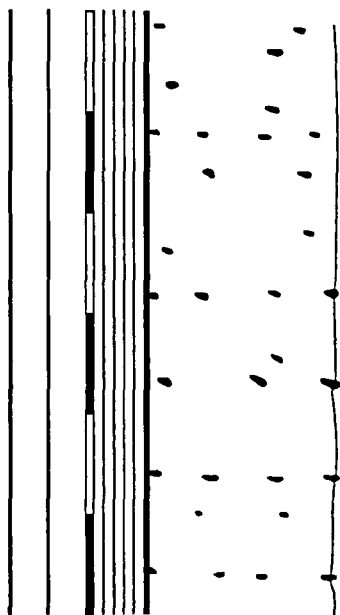
Belle Tout Marl 3

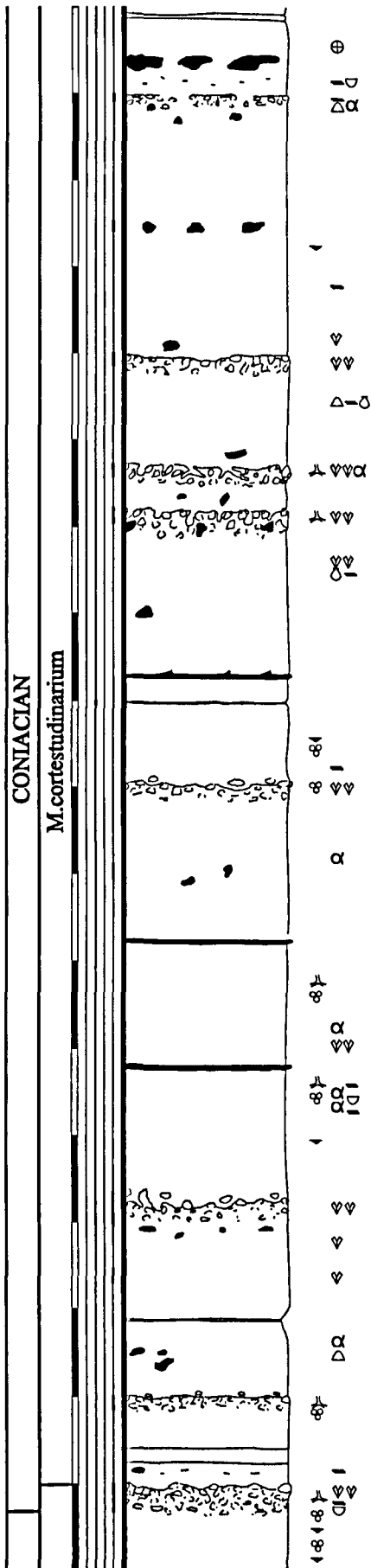
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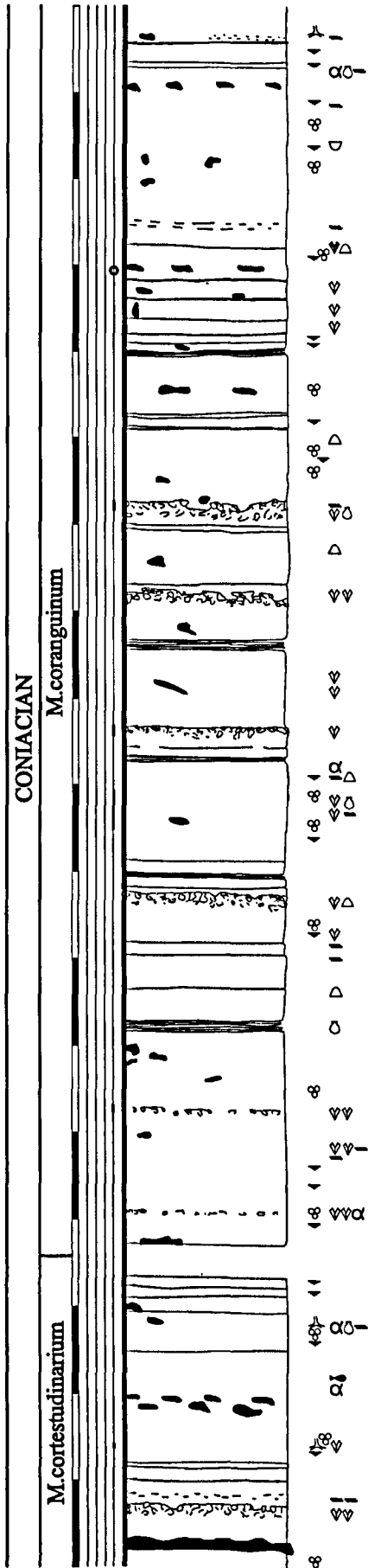
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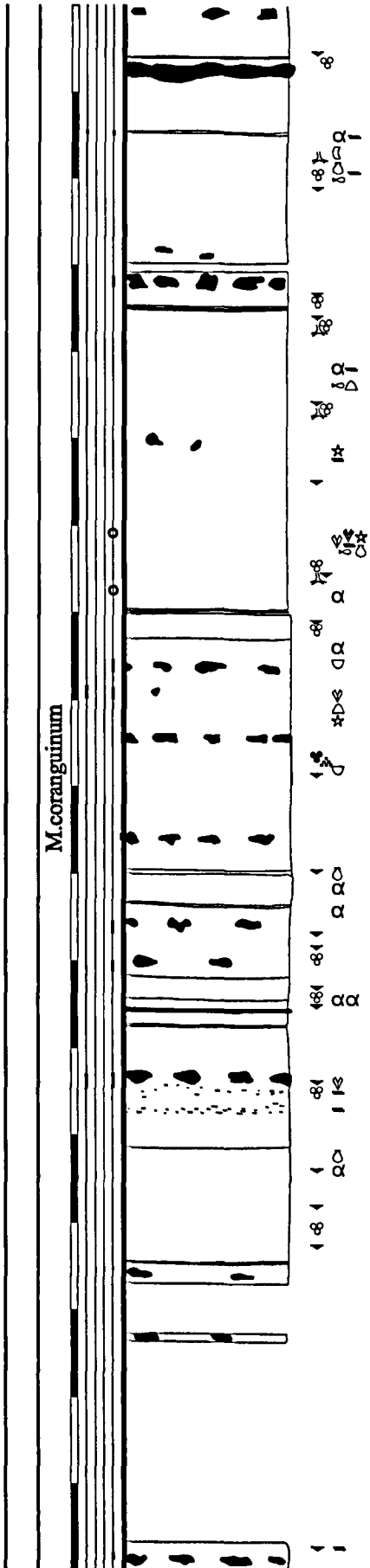


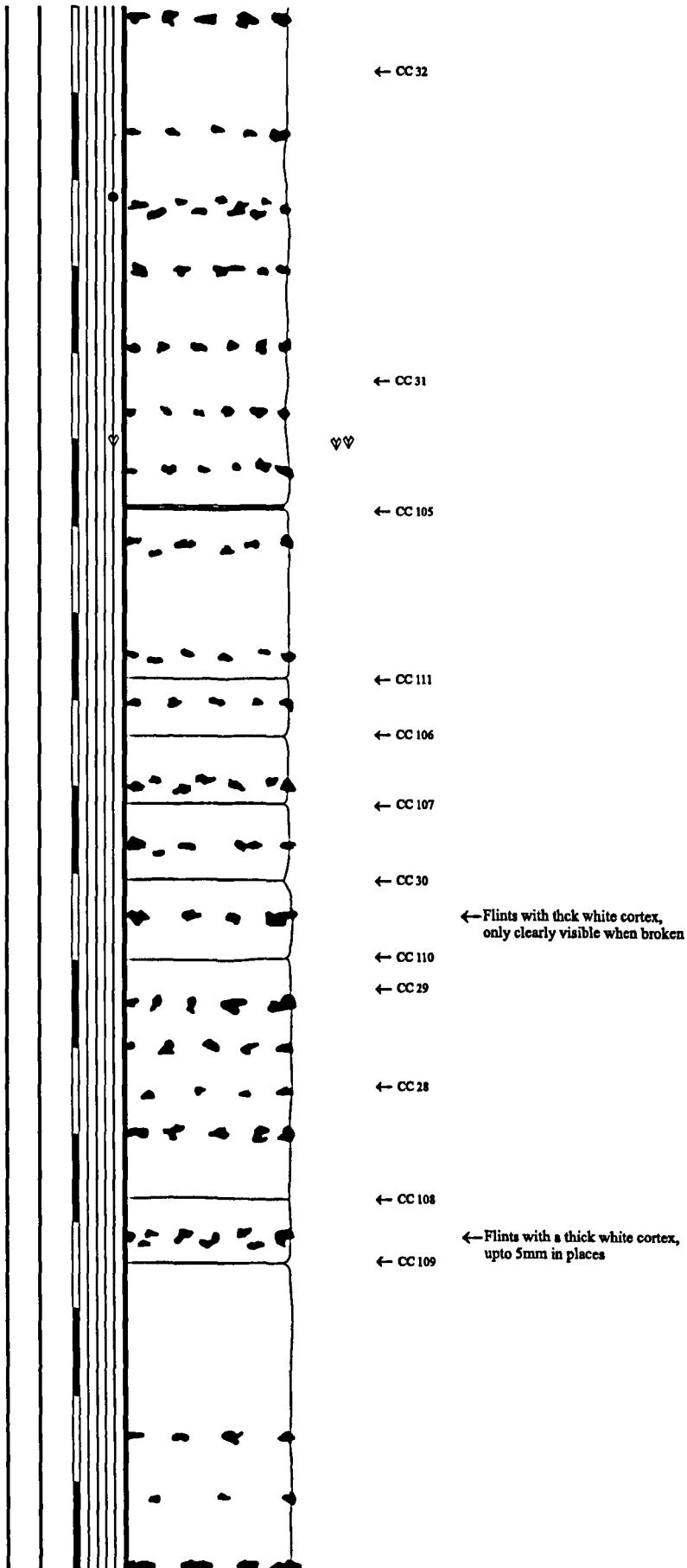


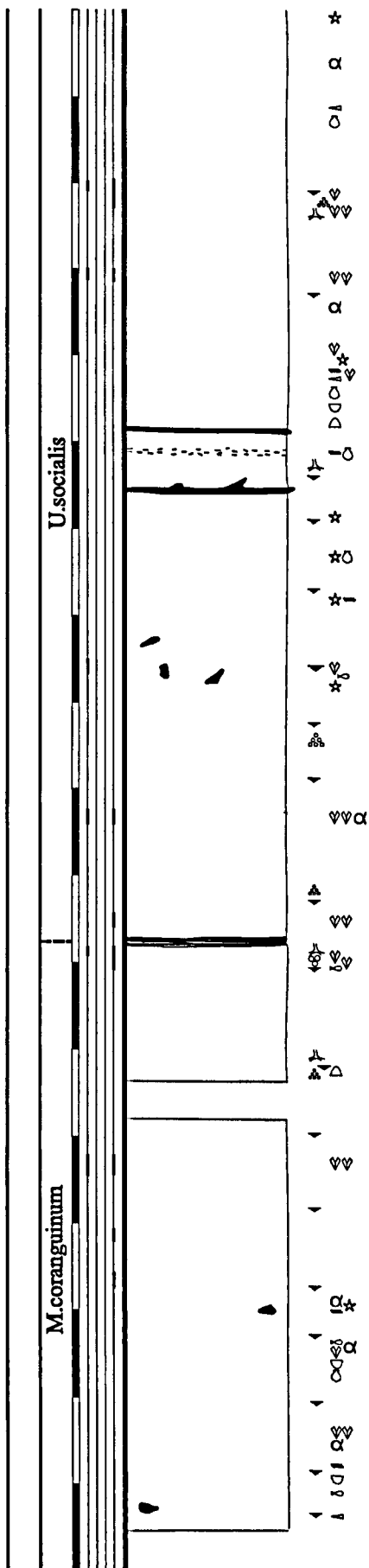


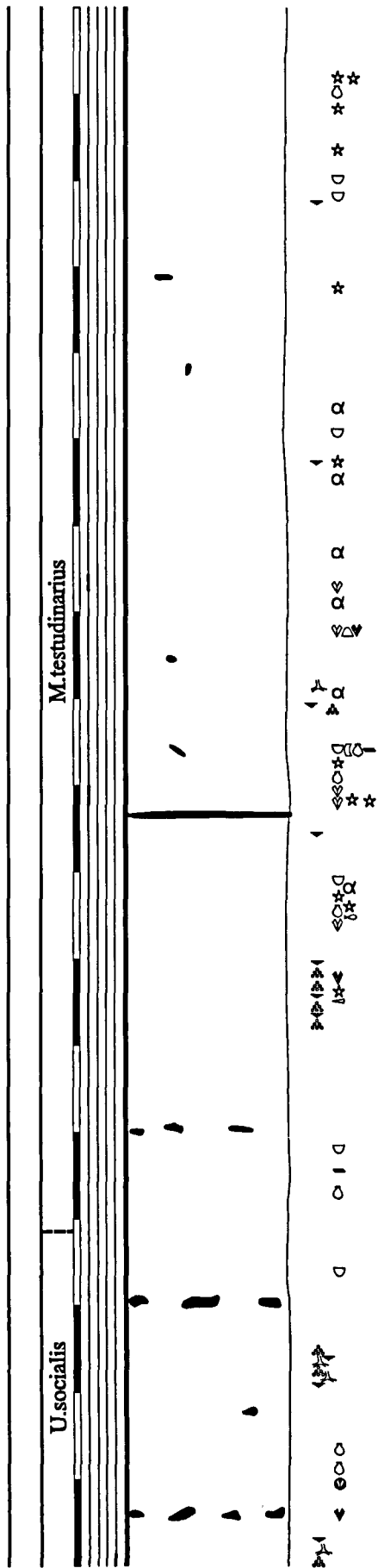


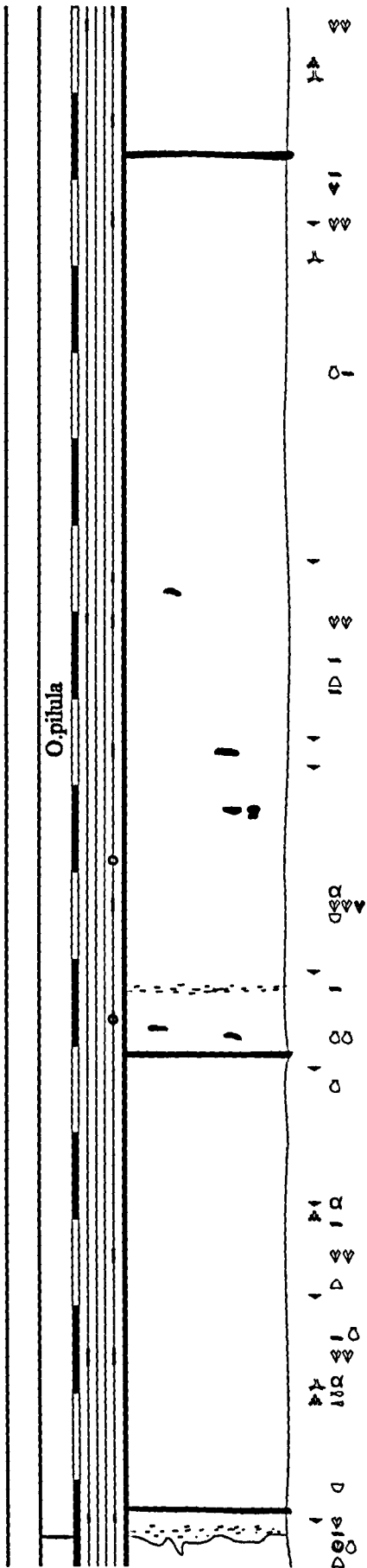


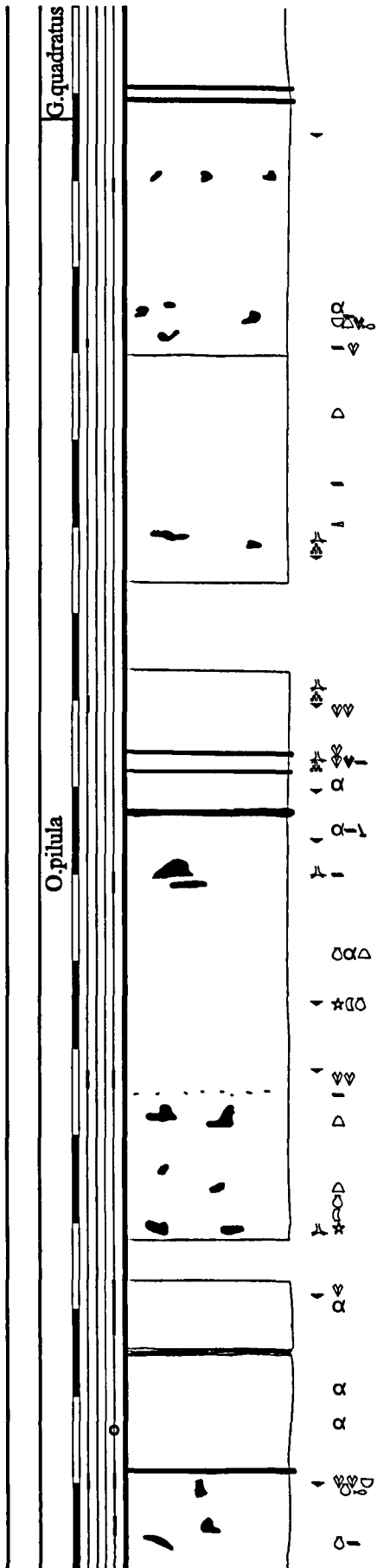


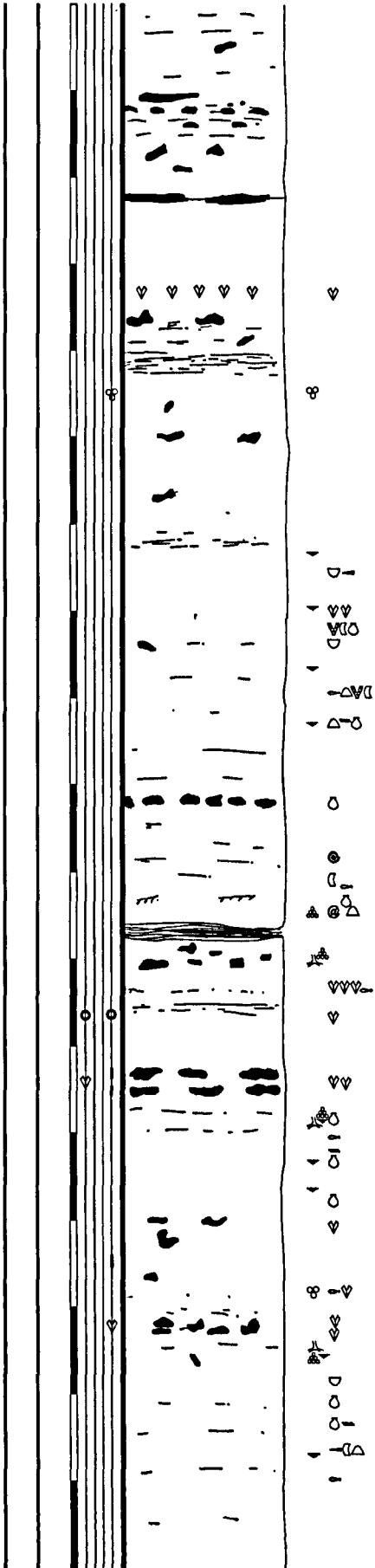


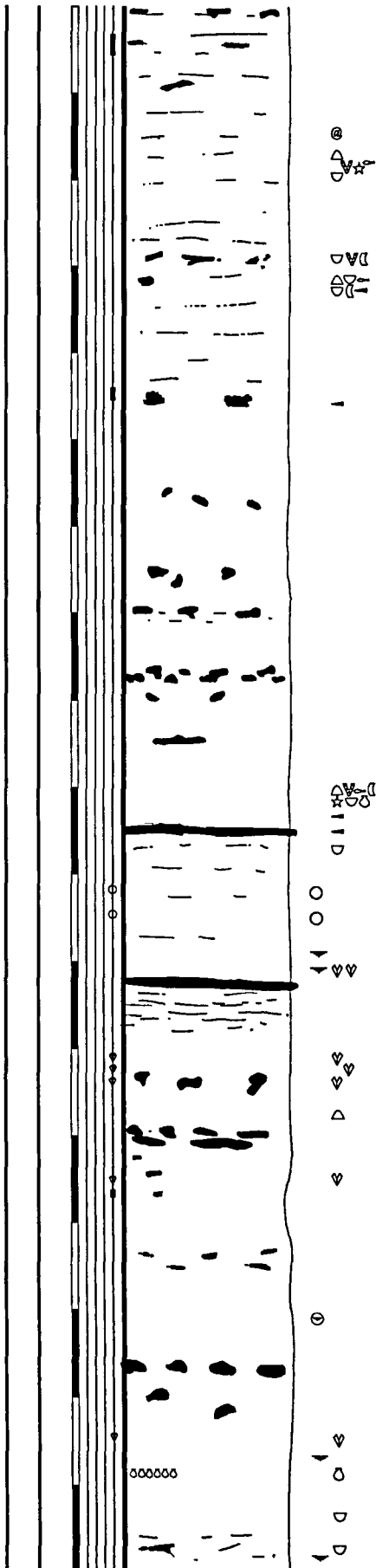


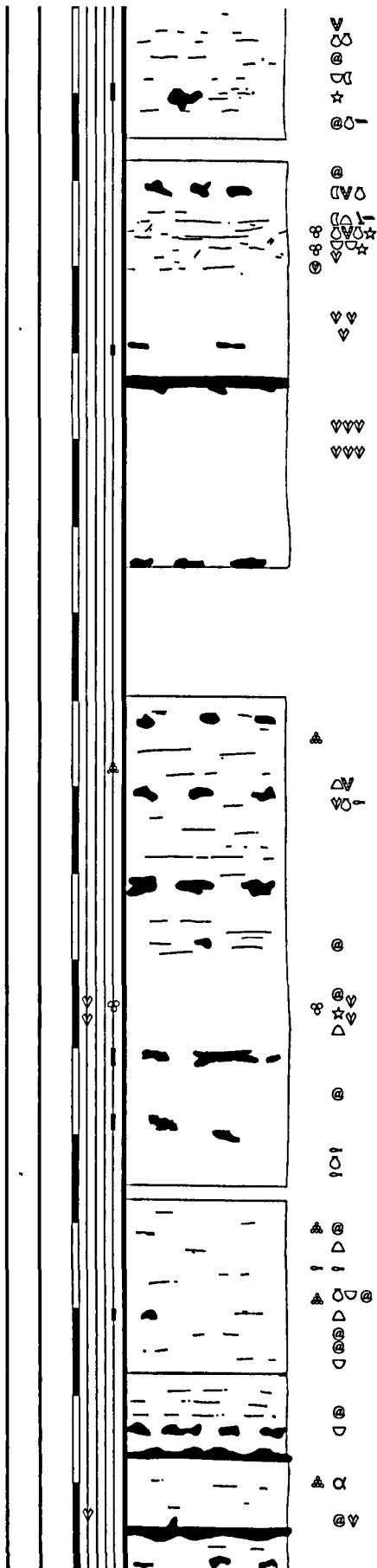


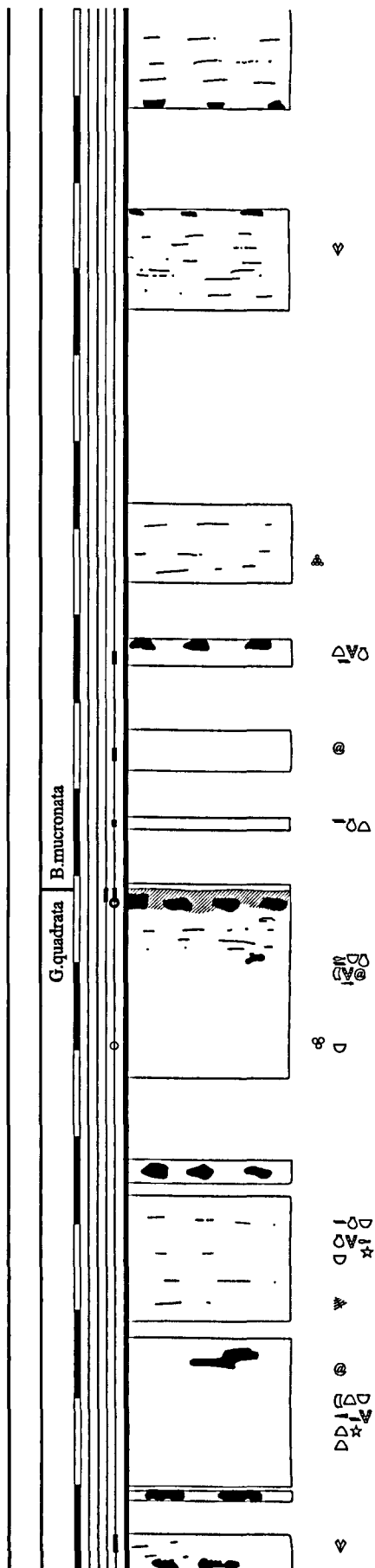












Phosphatised H/G surface with Marcasite

Fe stained (brown)

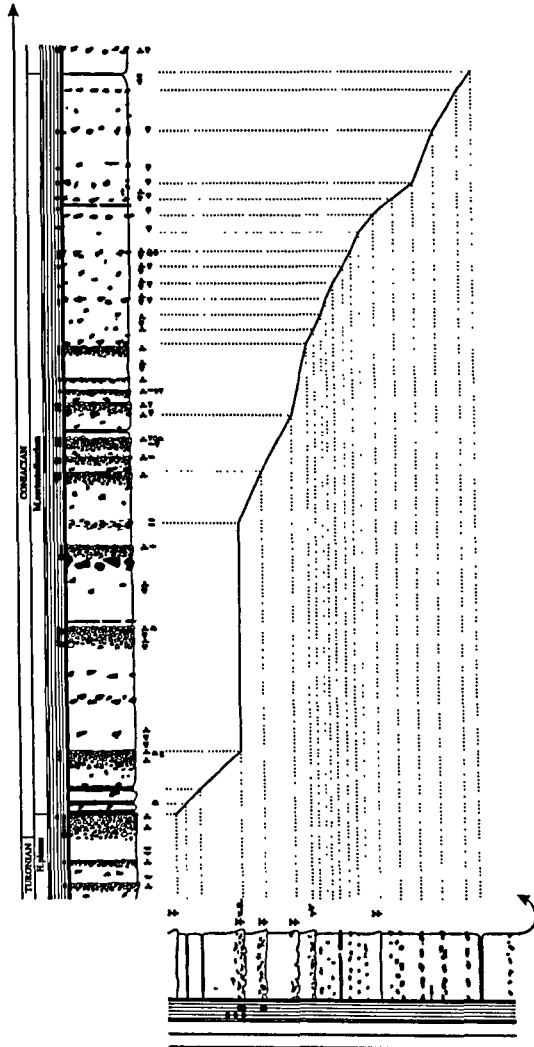
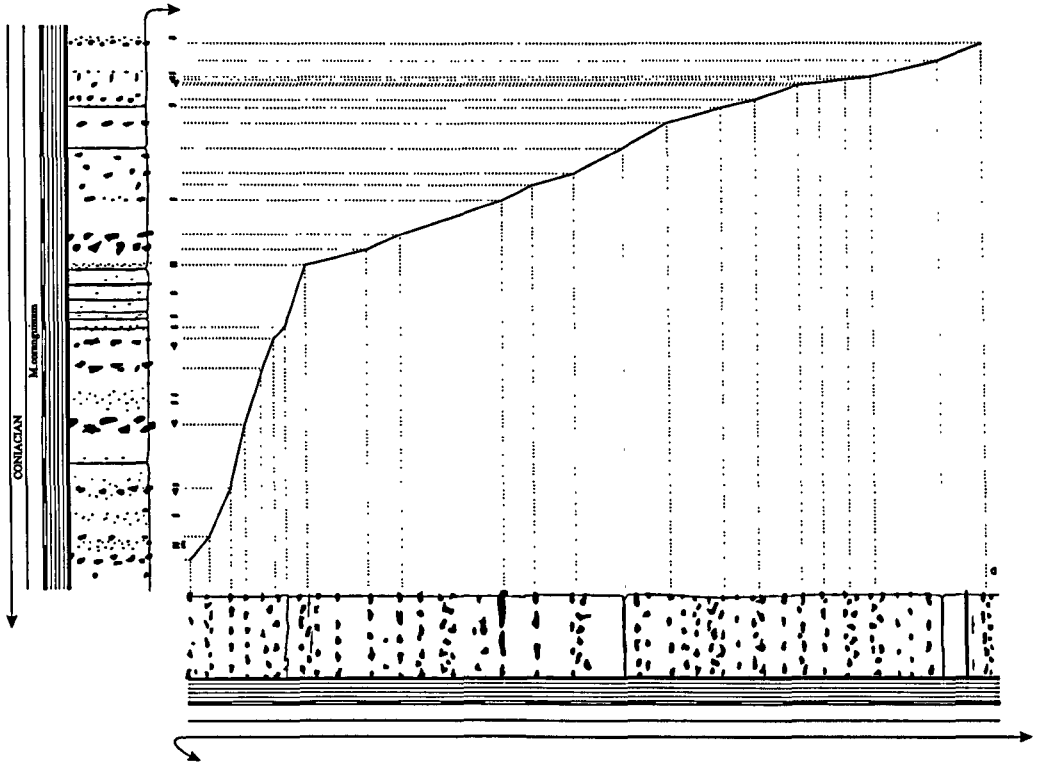
Appendix B

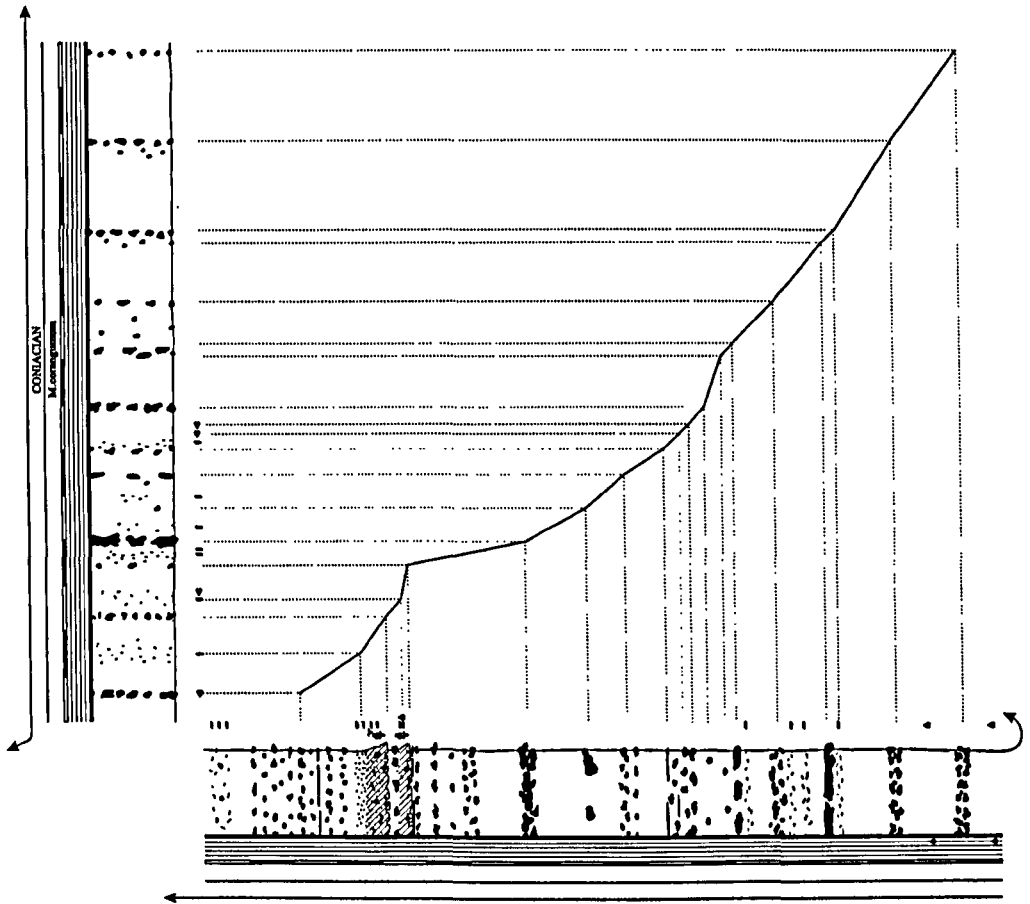
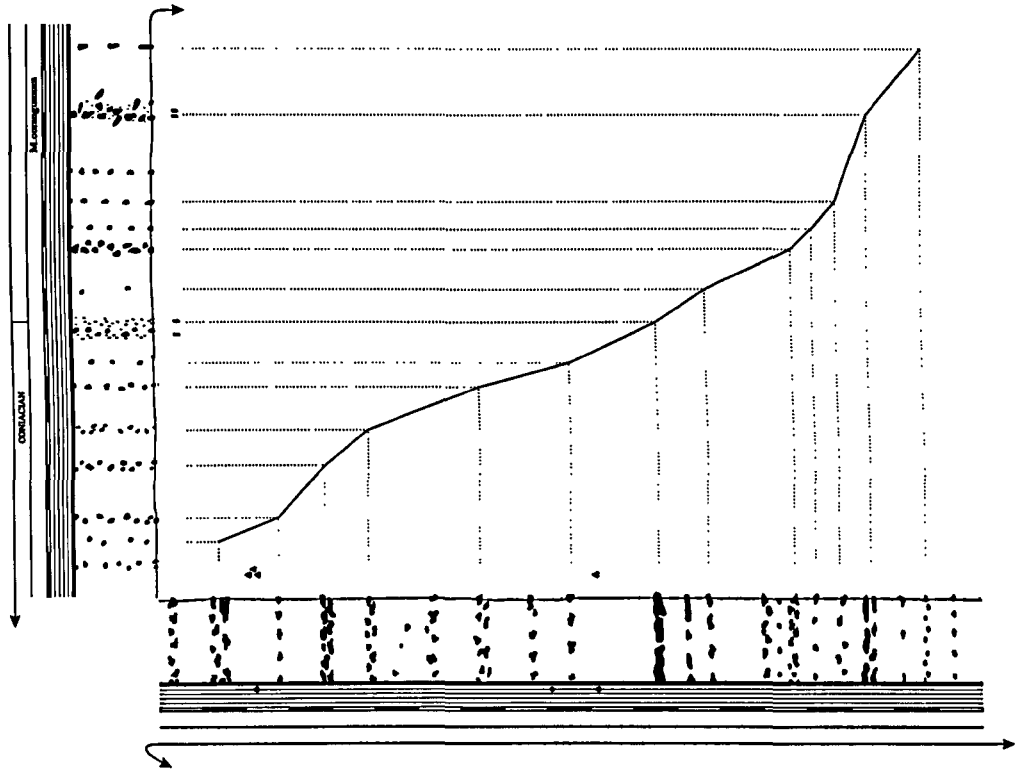
Cross-Plots

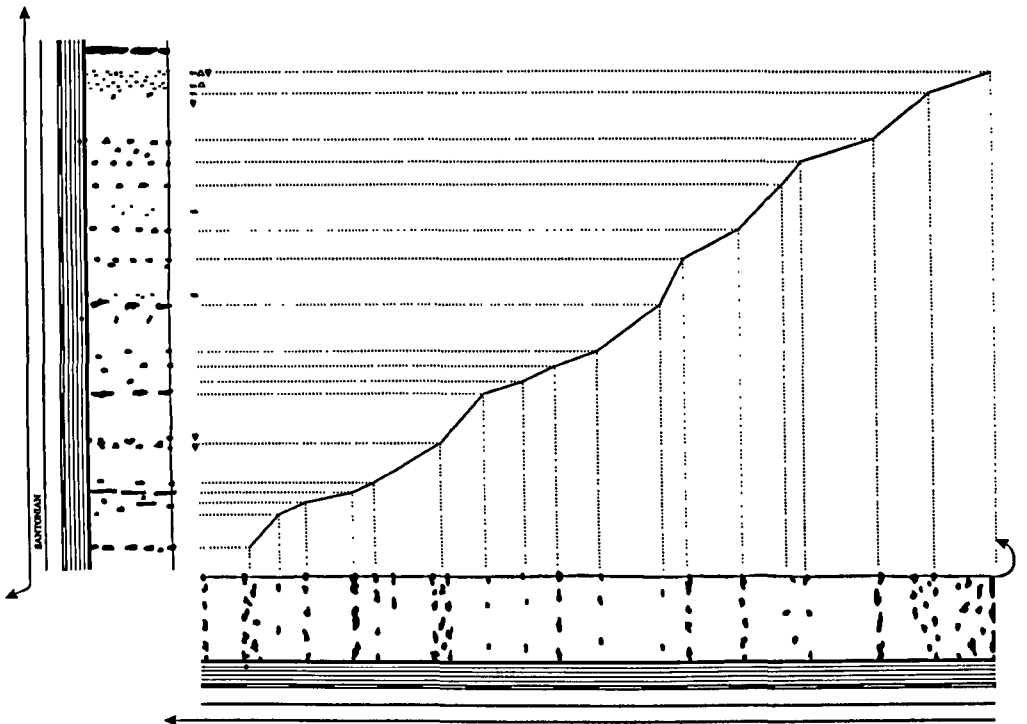
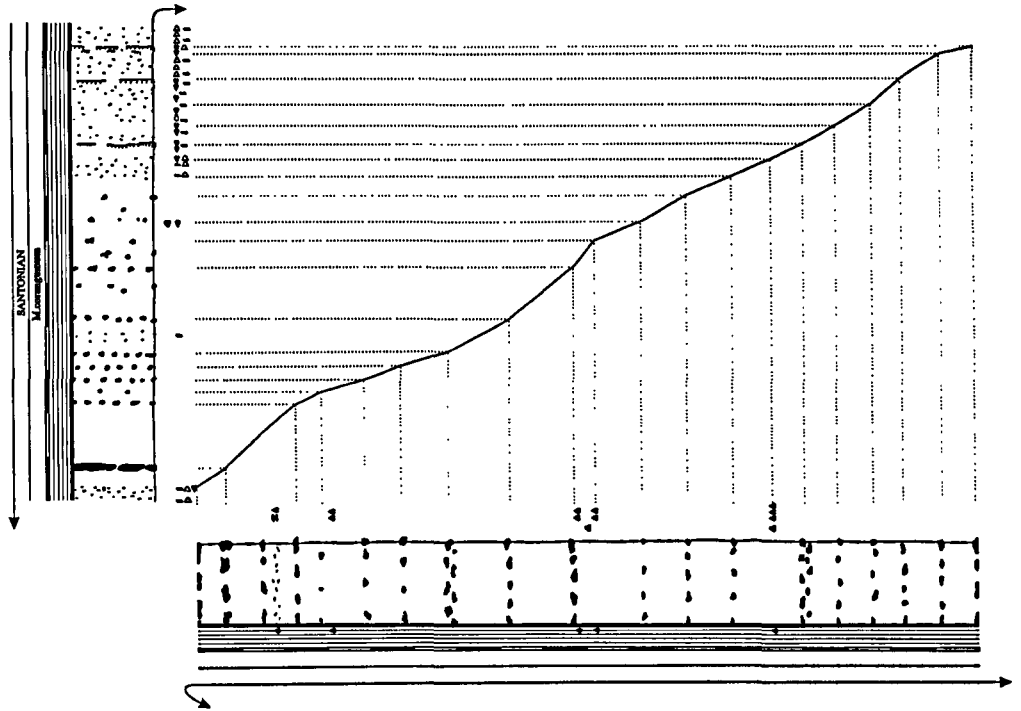
The main sections used in the sequence stratigraphical analyses, Culver Cliff, East Kent Coast, Pr cy-sur-Oise, Seaford Head and the Trunch borehole are cross-plotted against each other.

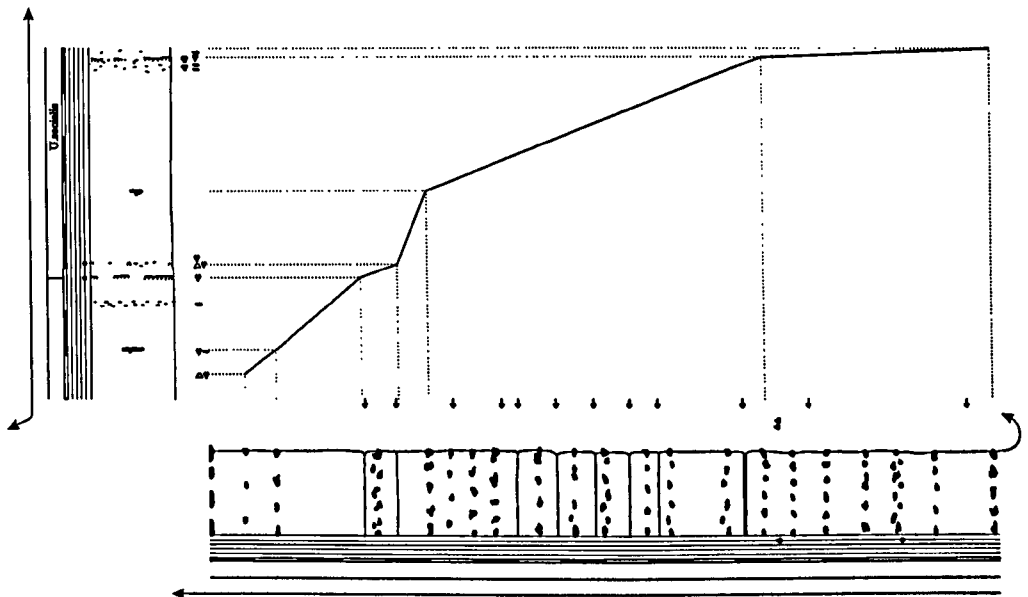
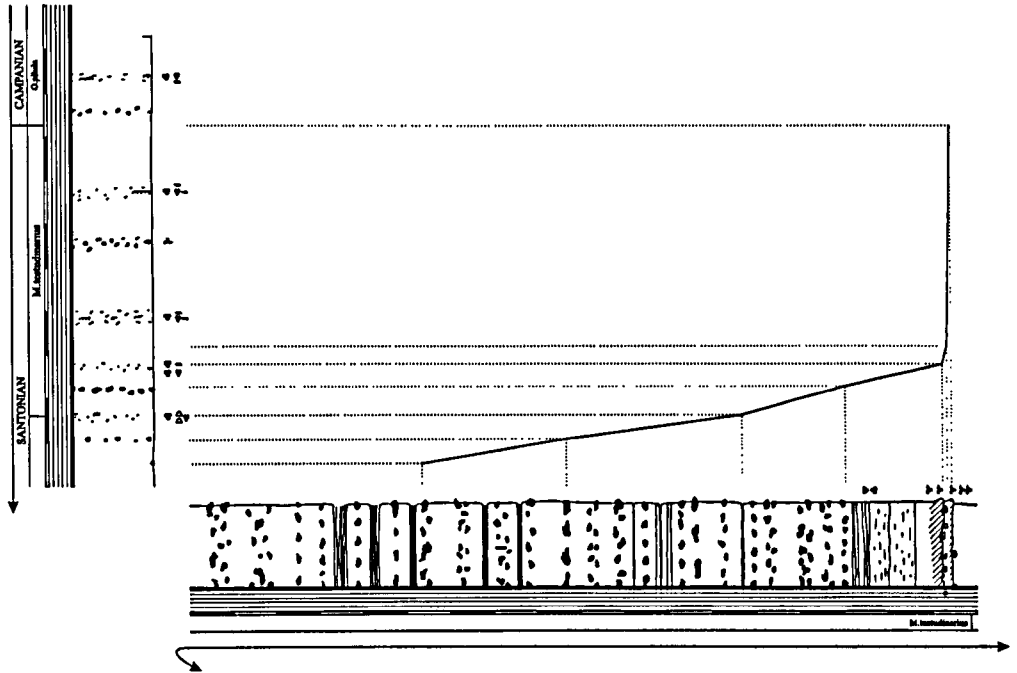
Secondary sections are cross plotted against the nearest convenient section to demonstrate the transfer of the sequence stratigraphical analysis to these less complete successions.

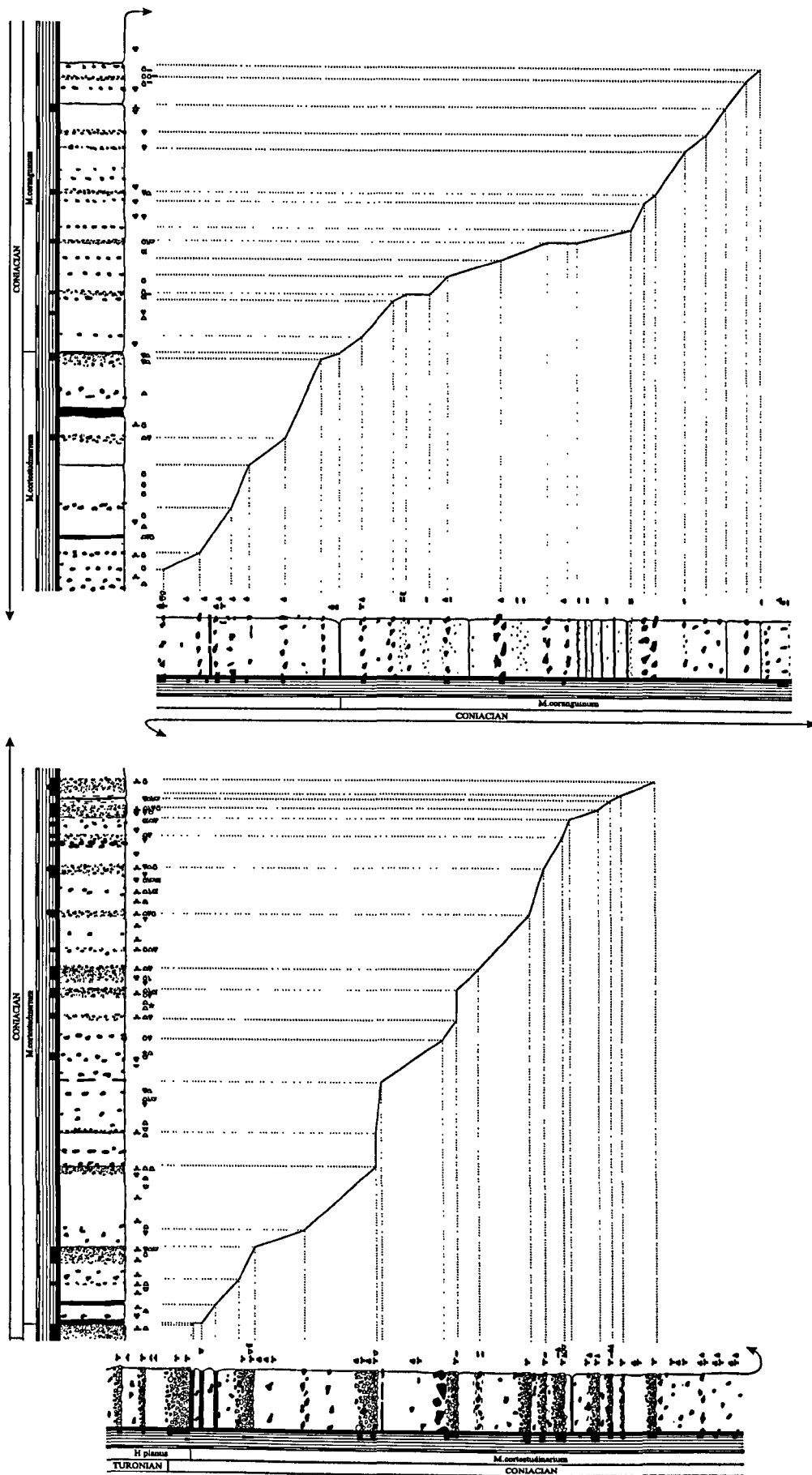
See inside front cover for the key to the logs. The first-named section is plotted on the horizontal.

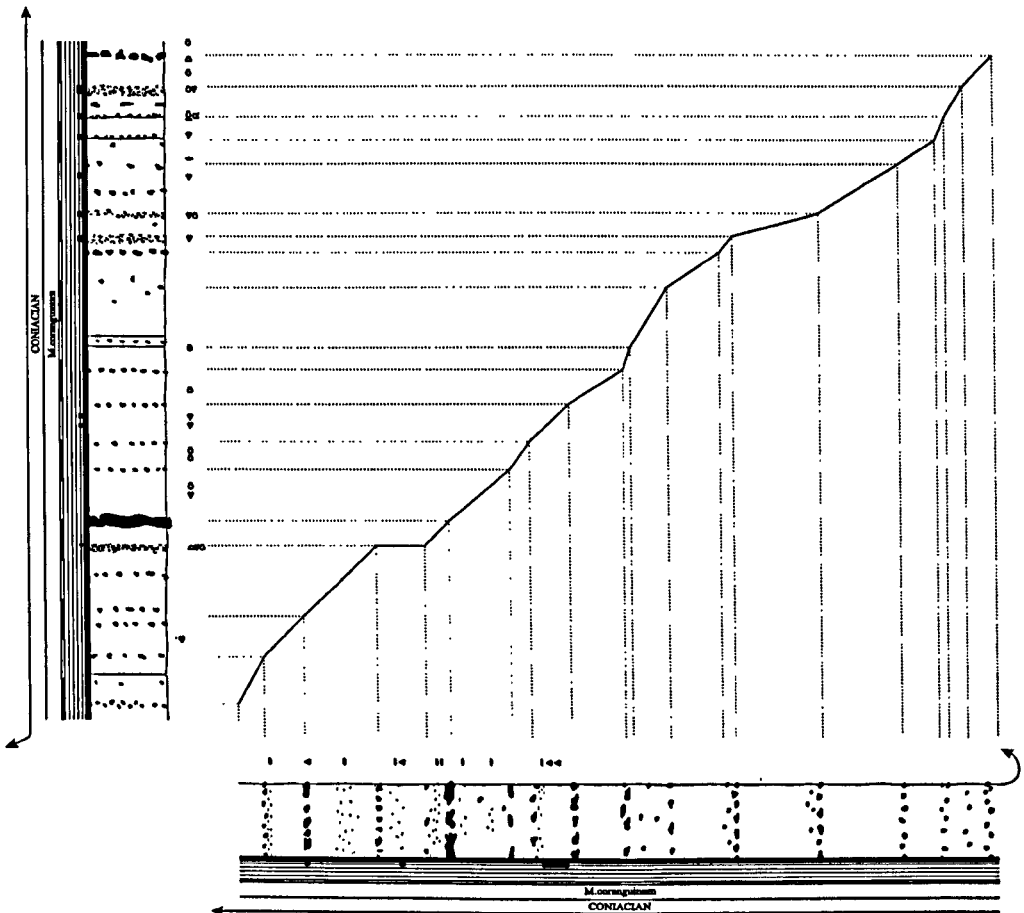
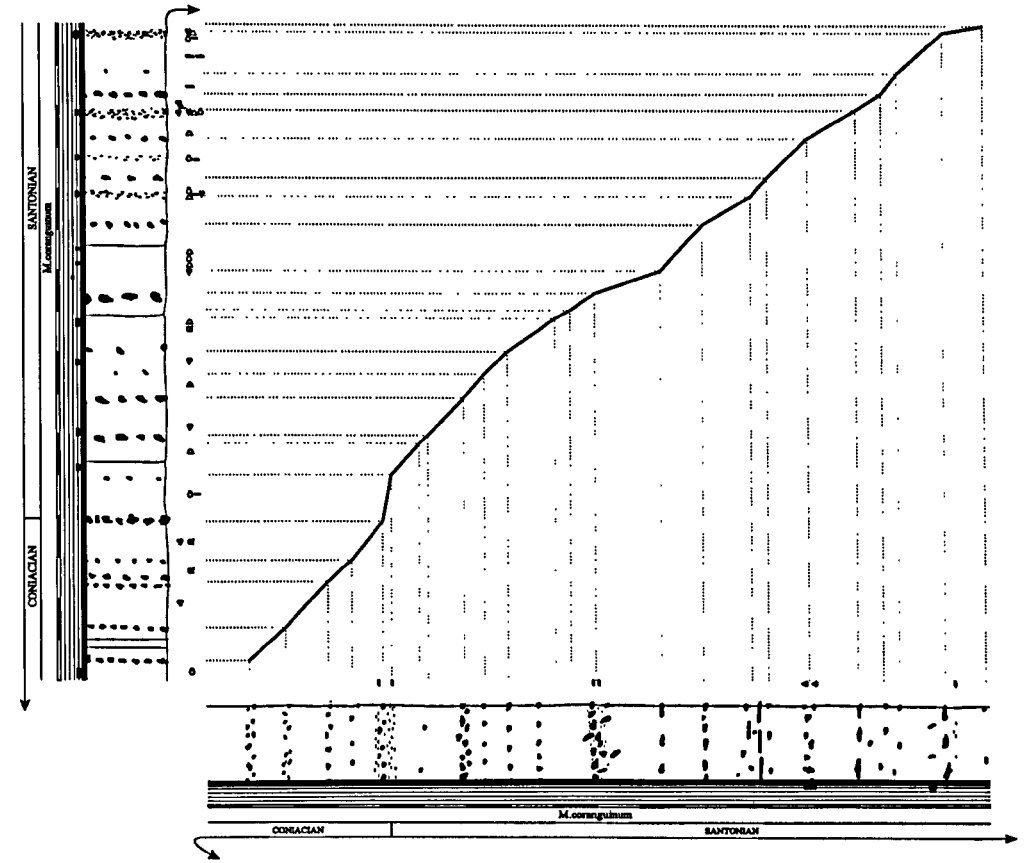


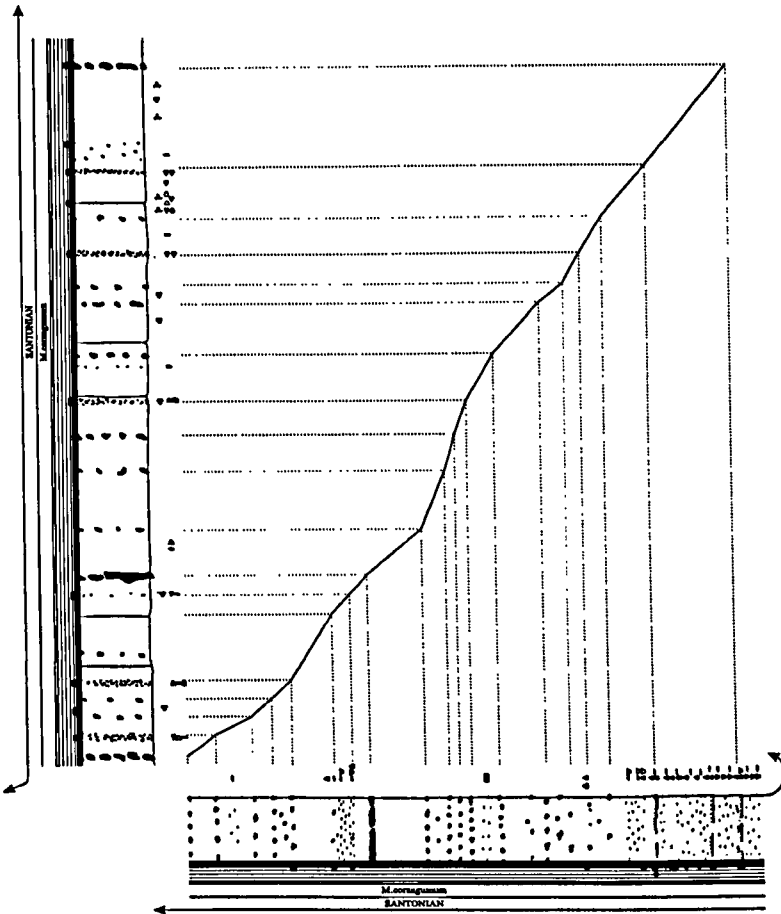
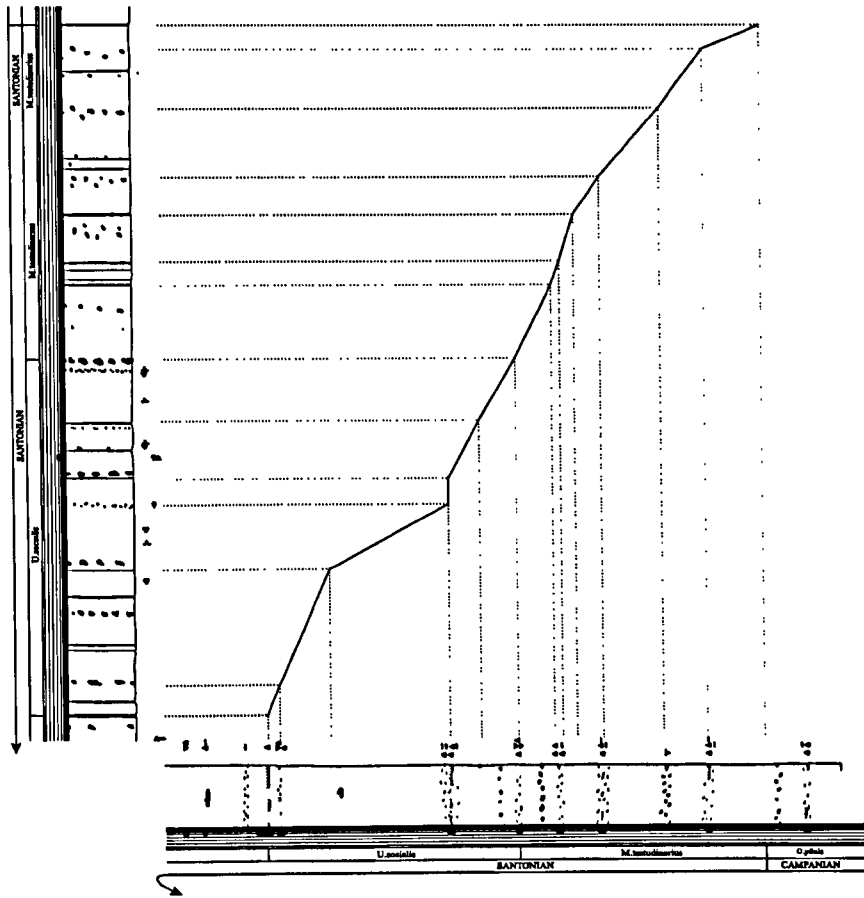


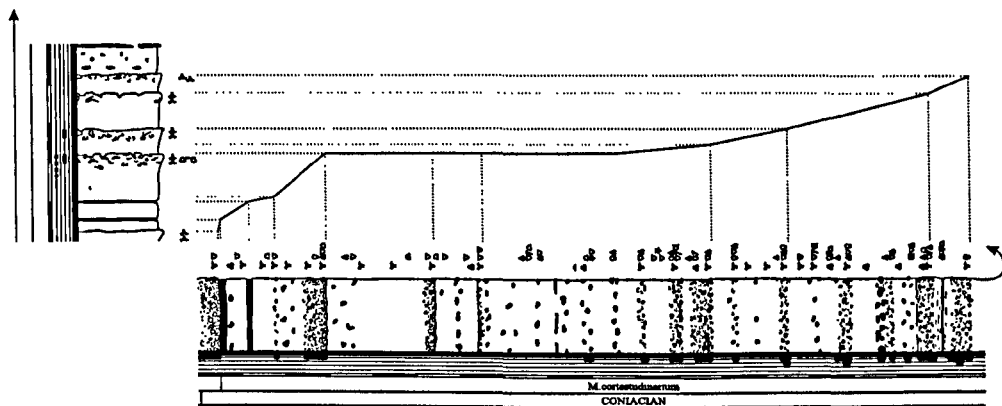
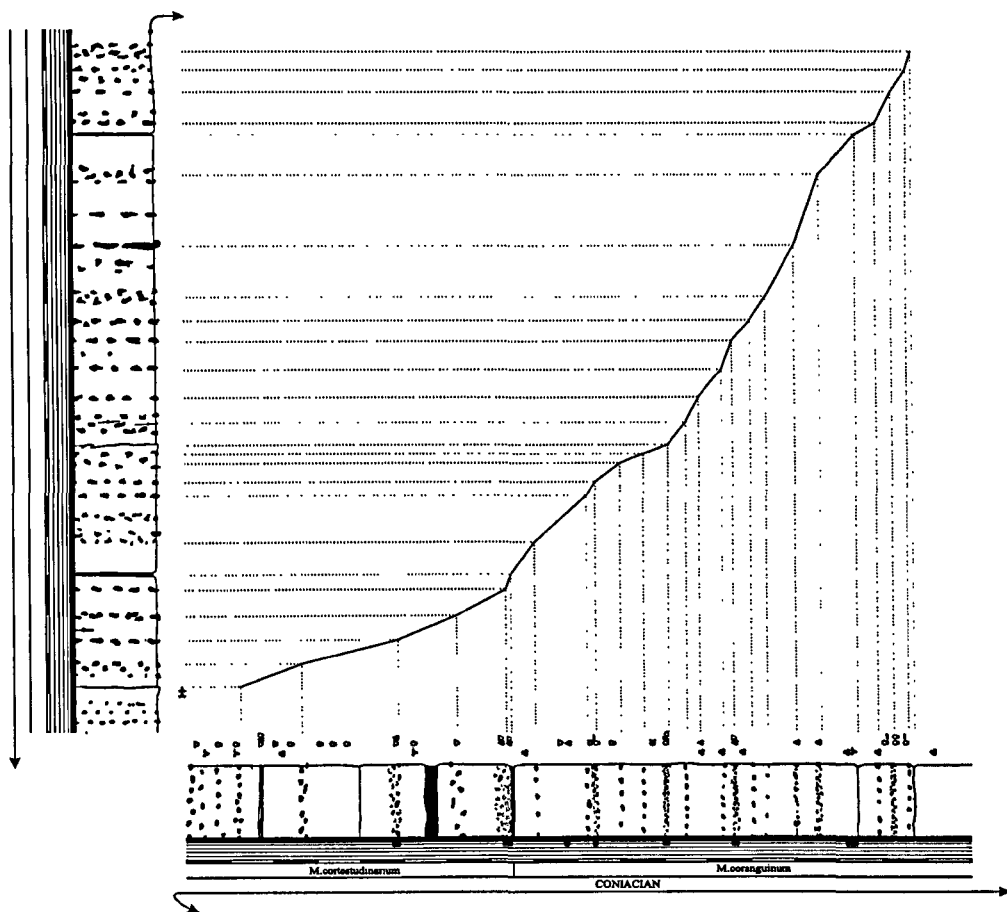


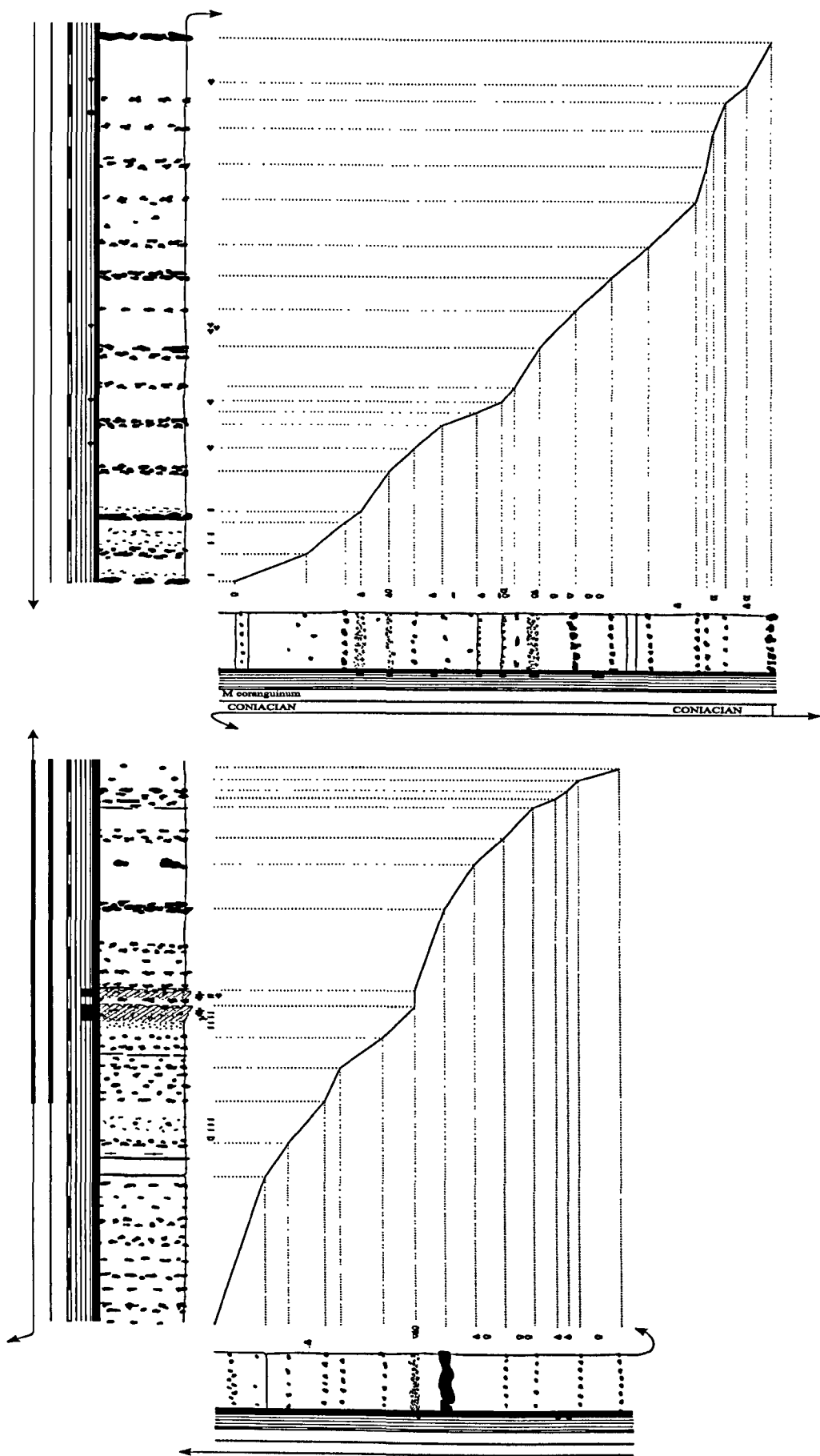


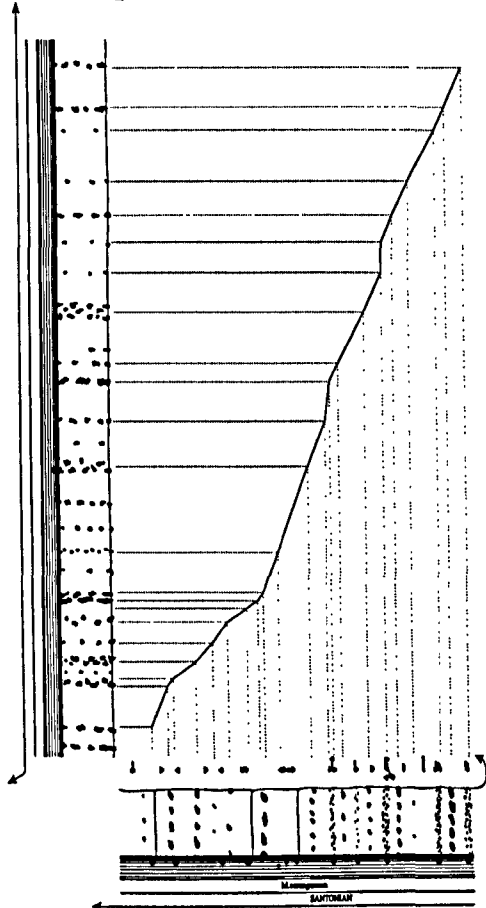
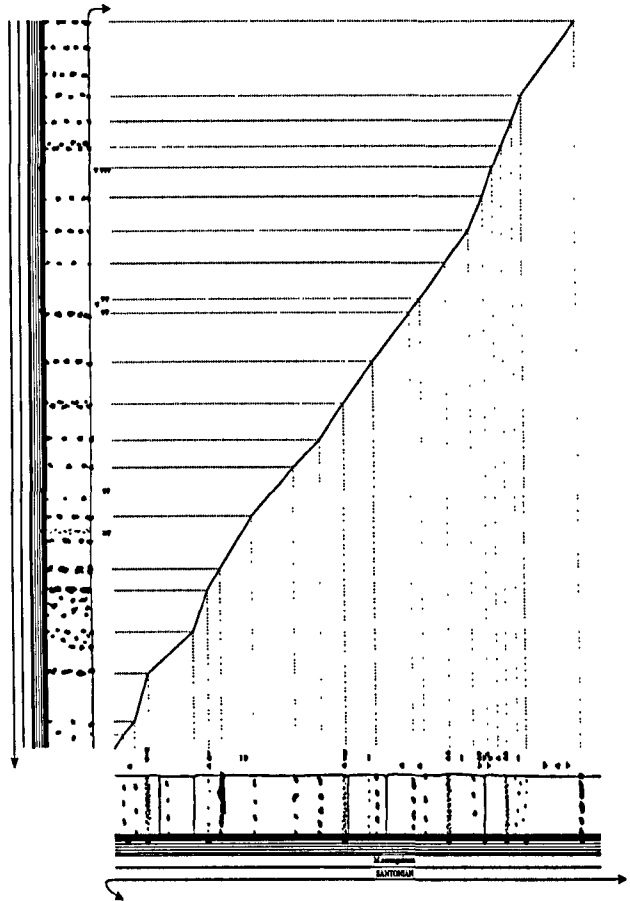


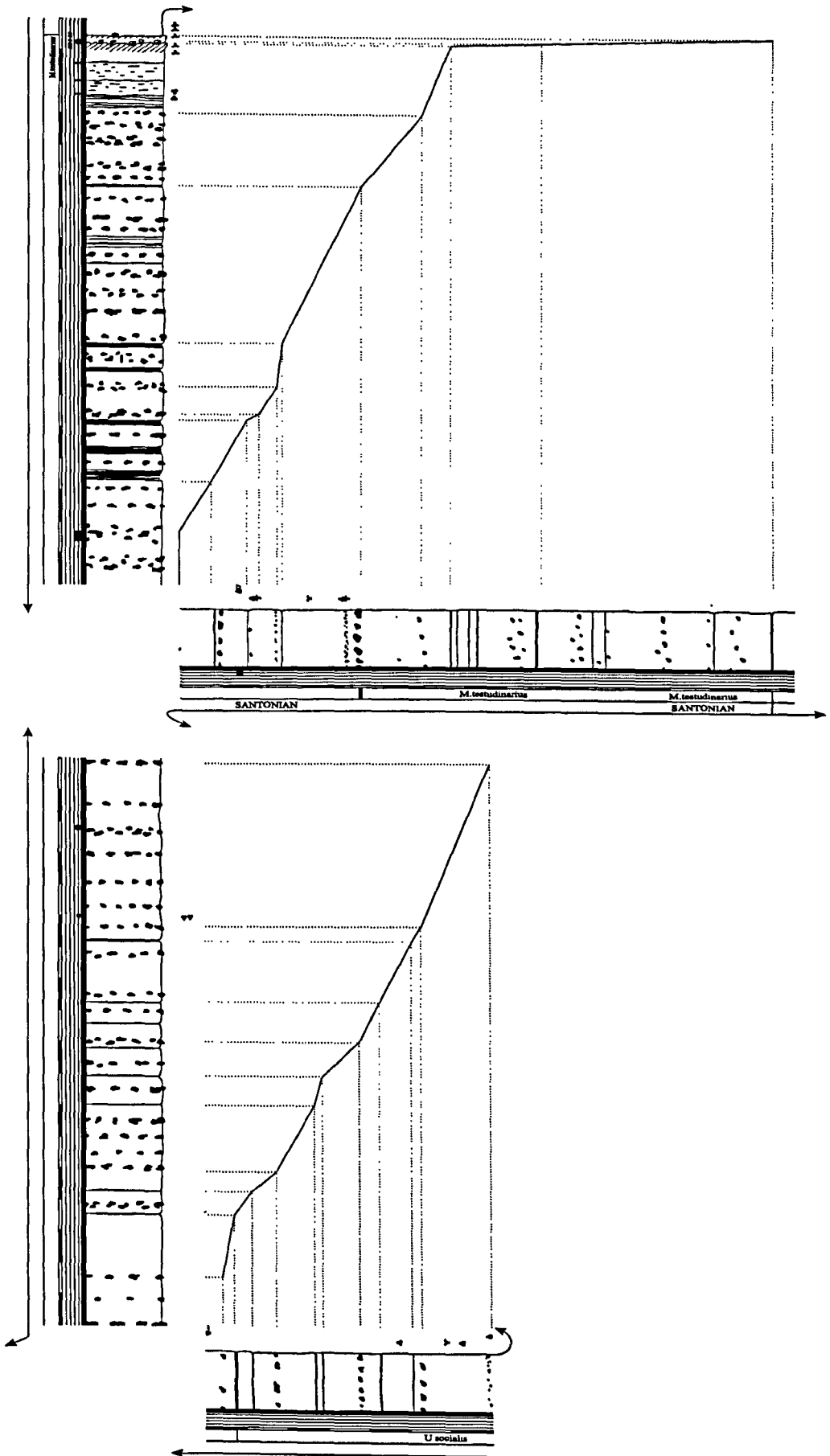


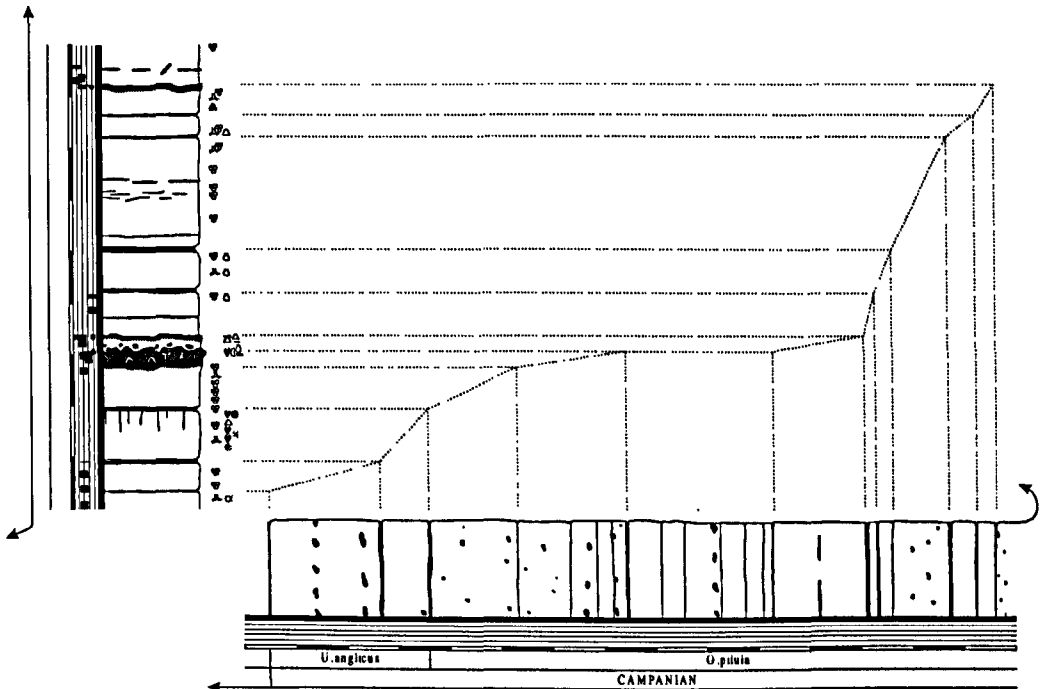
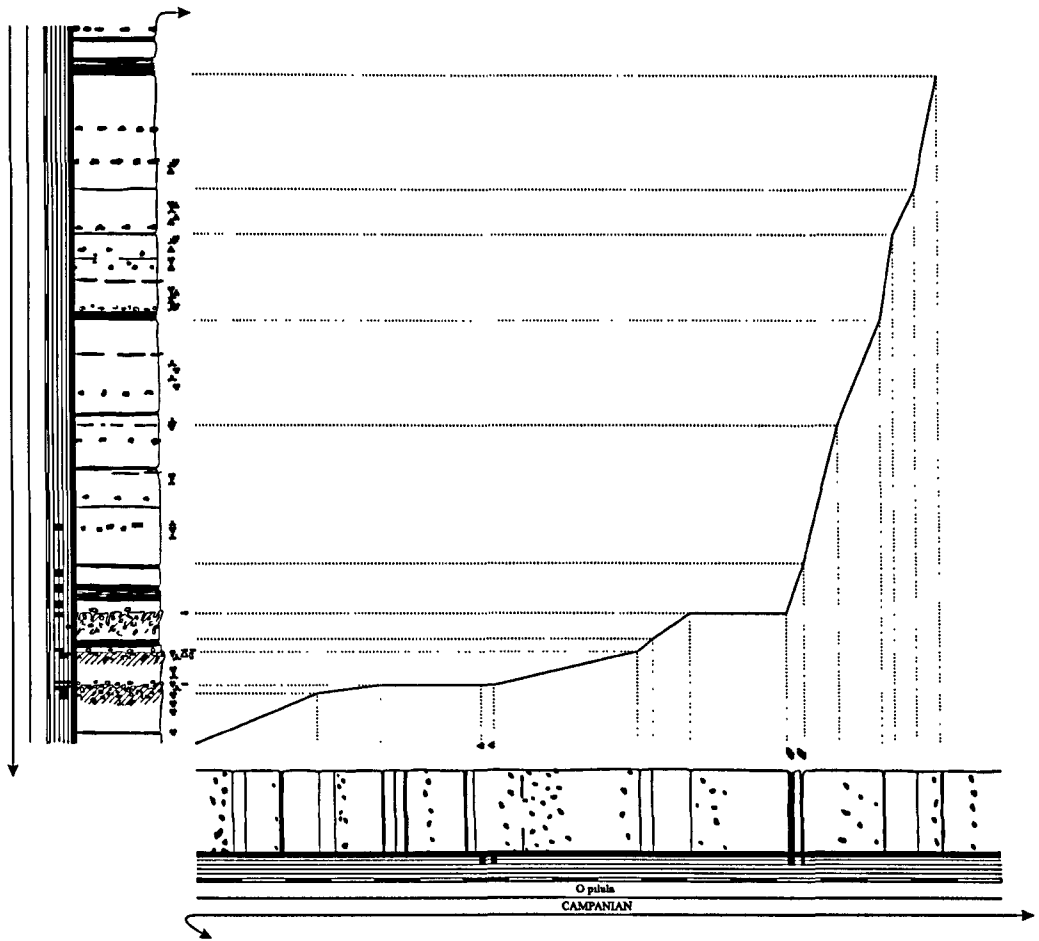


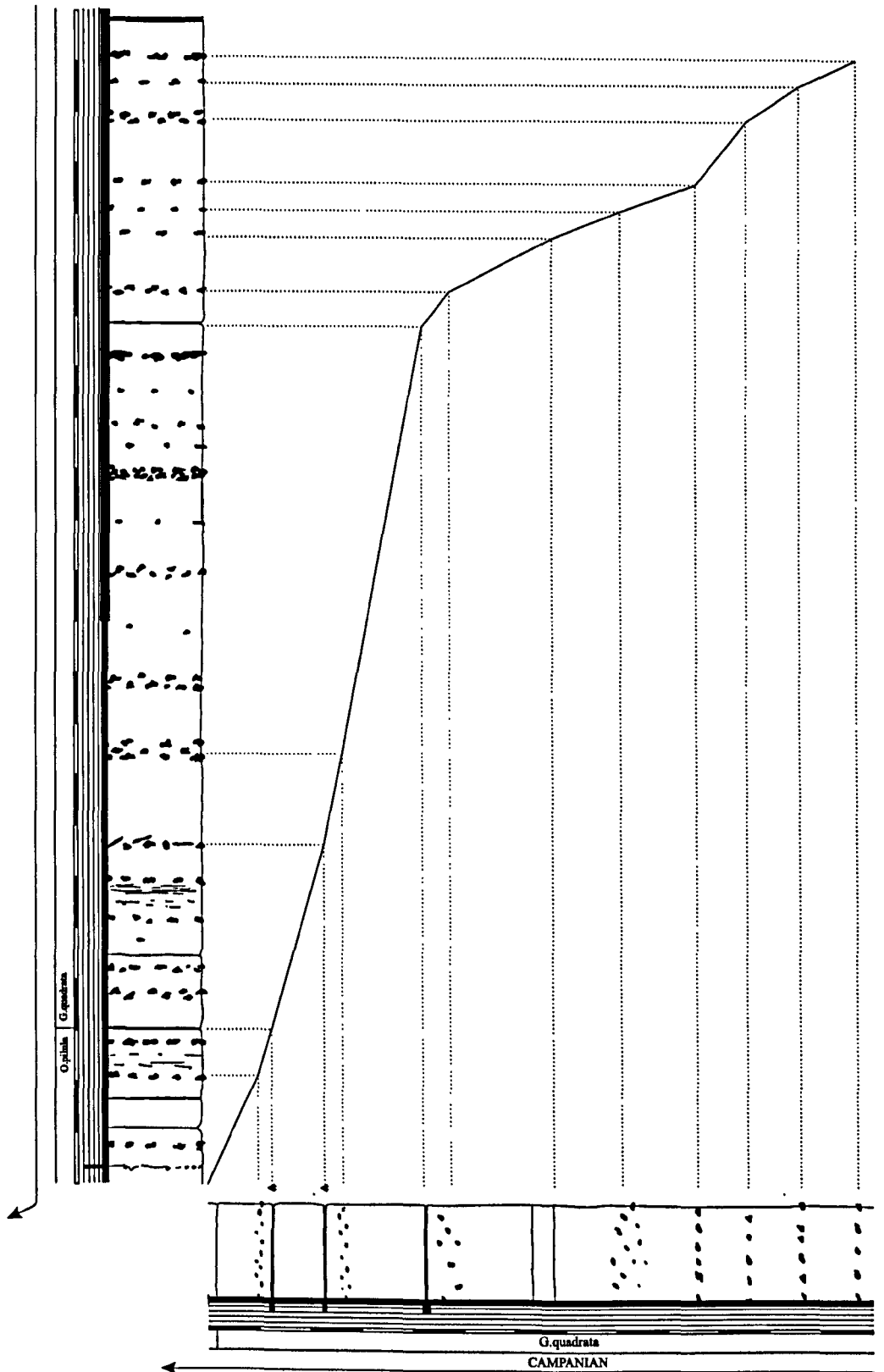


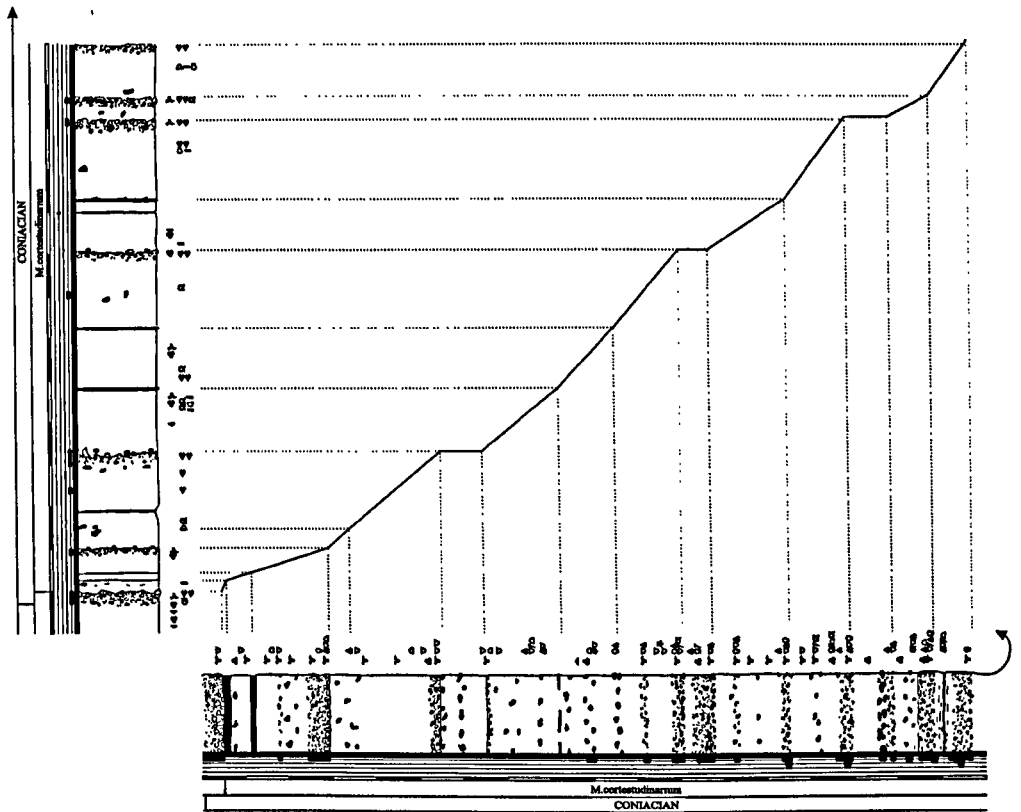
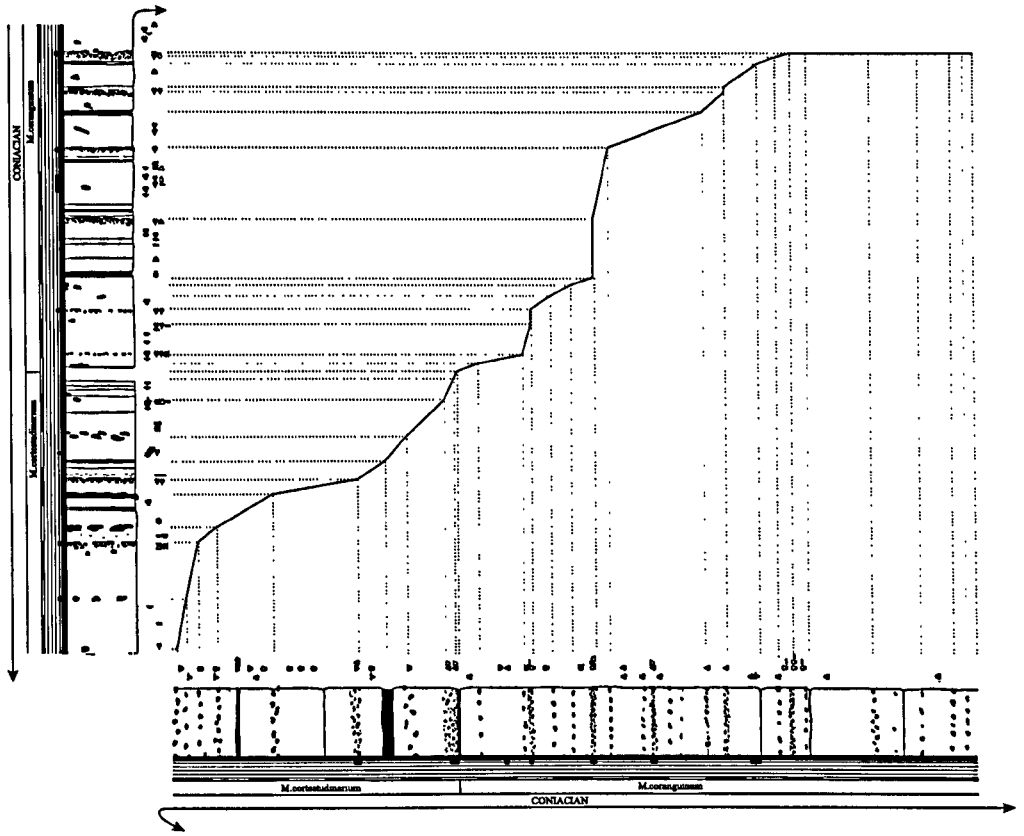


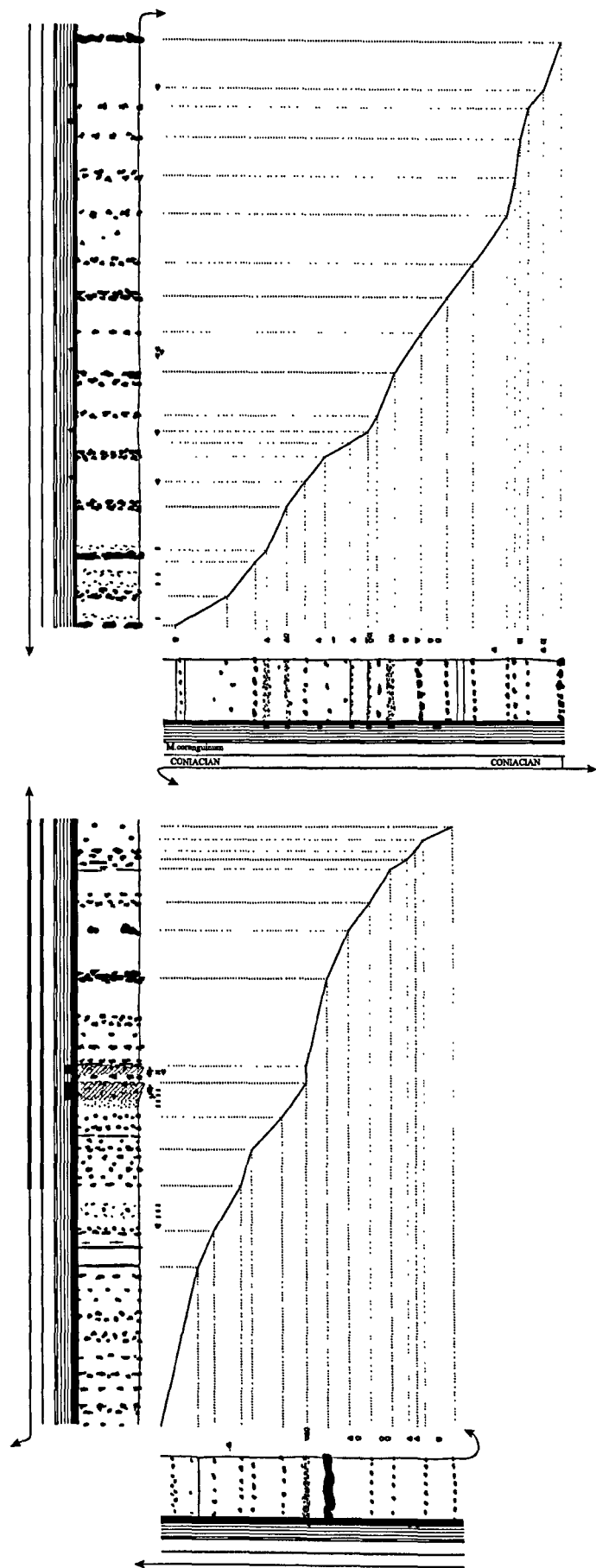


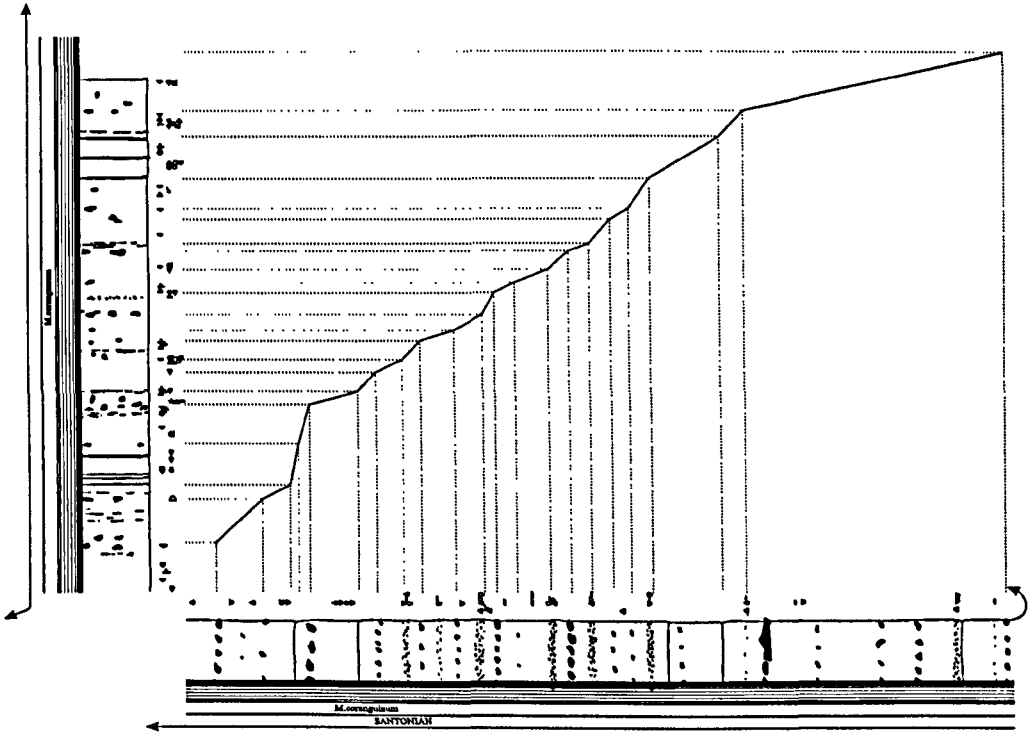
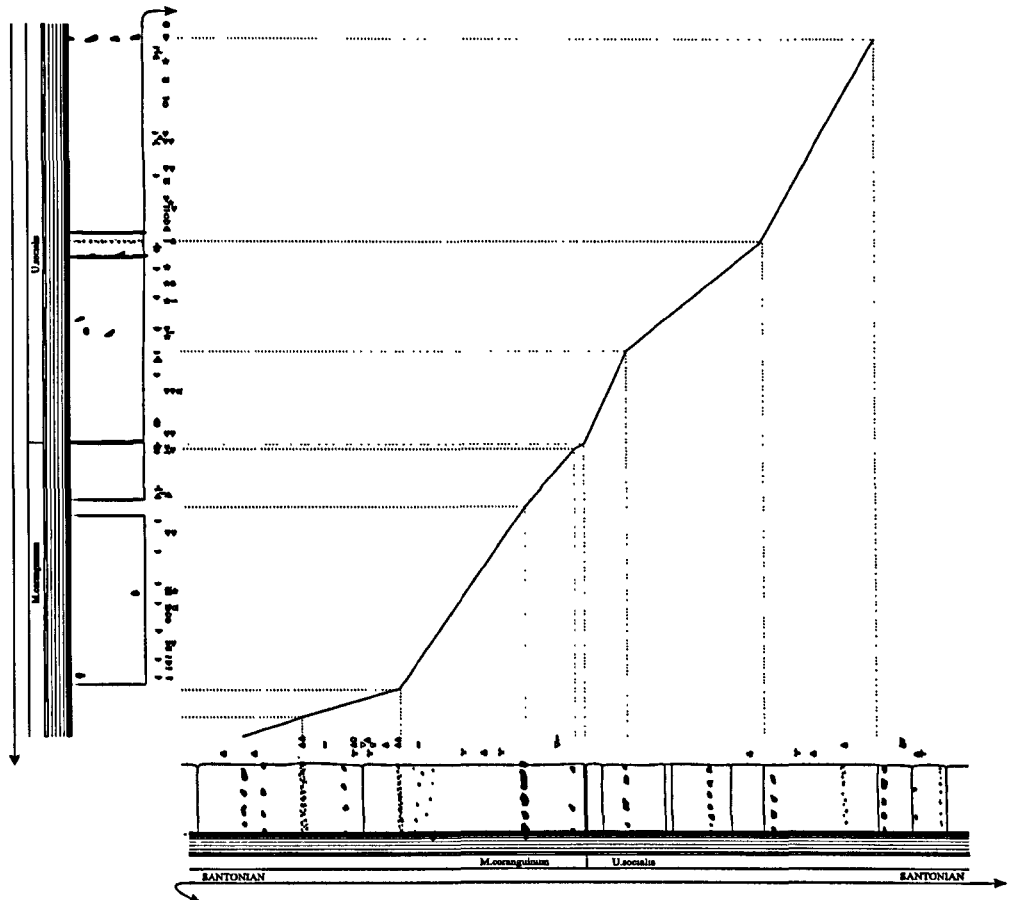


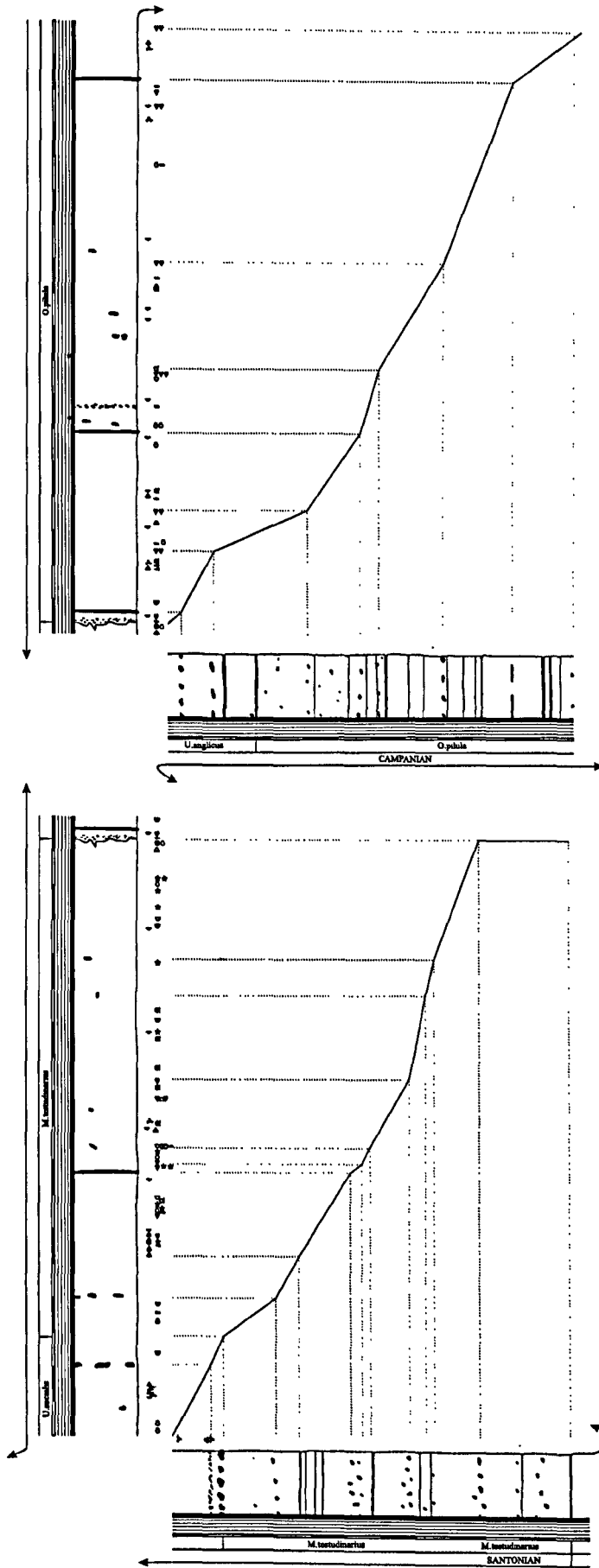


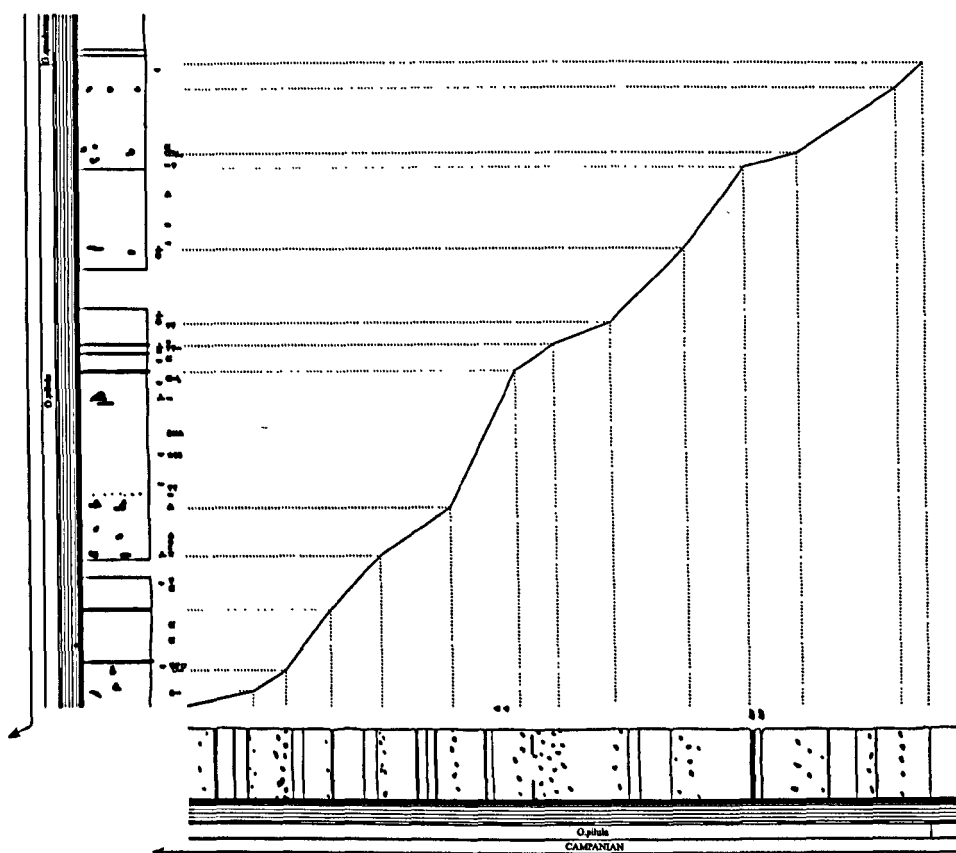


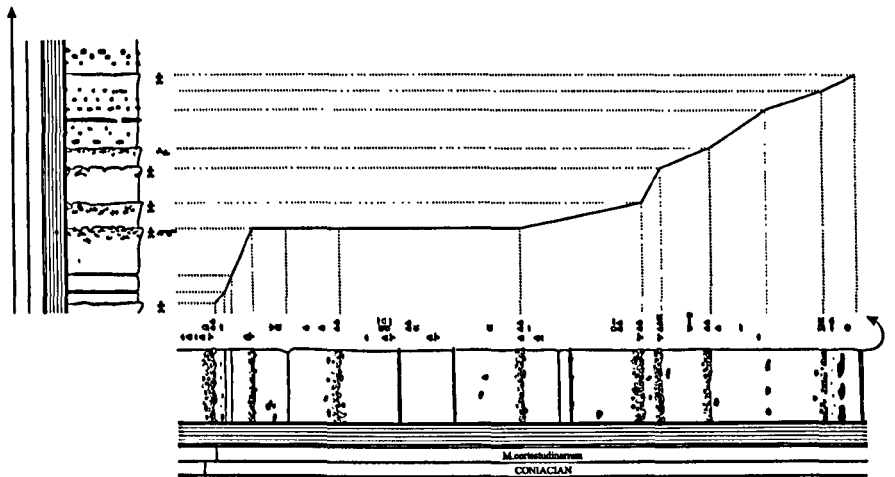
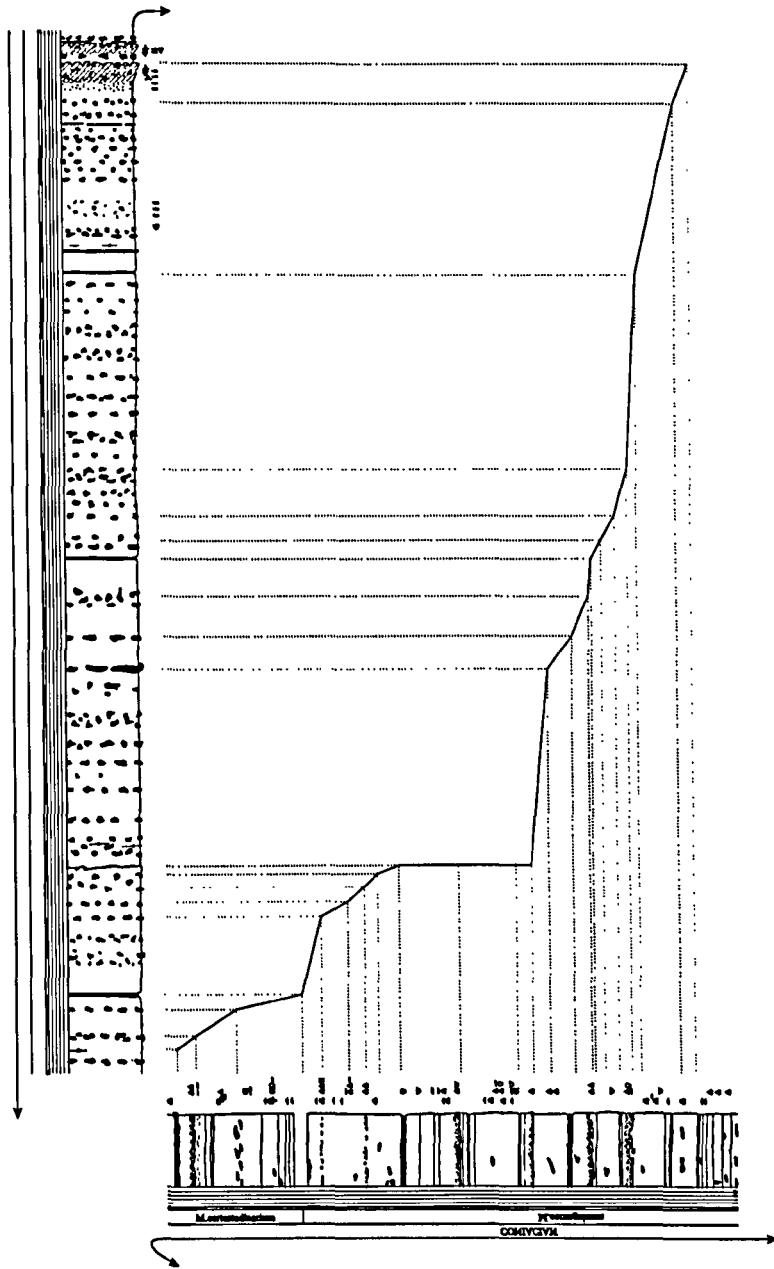


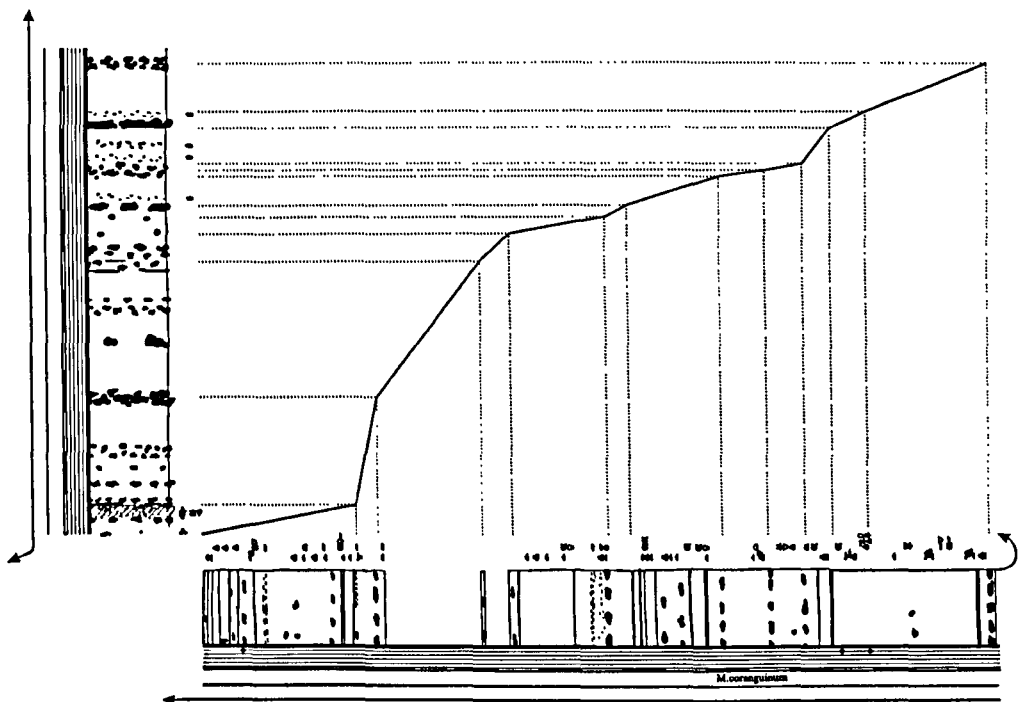
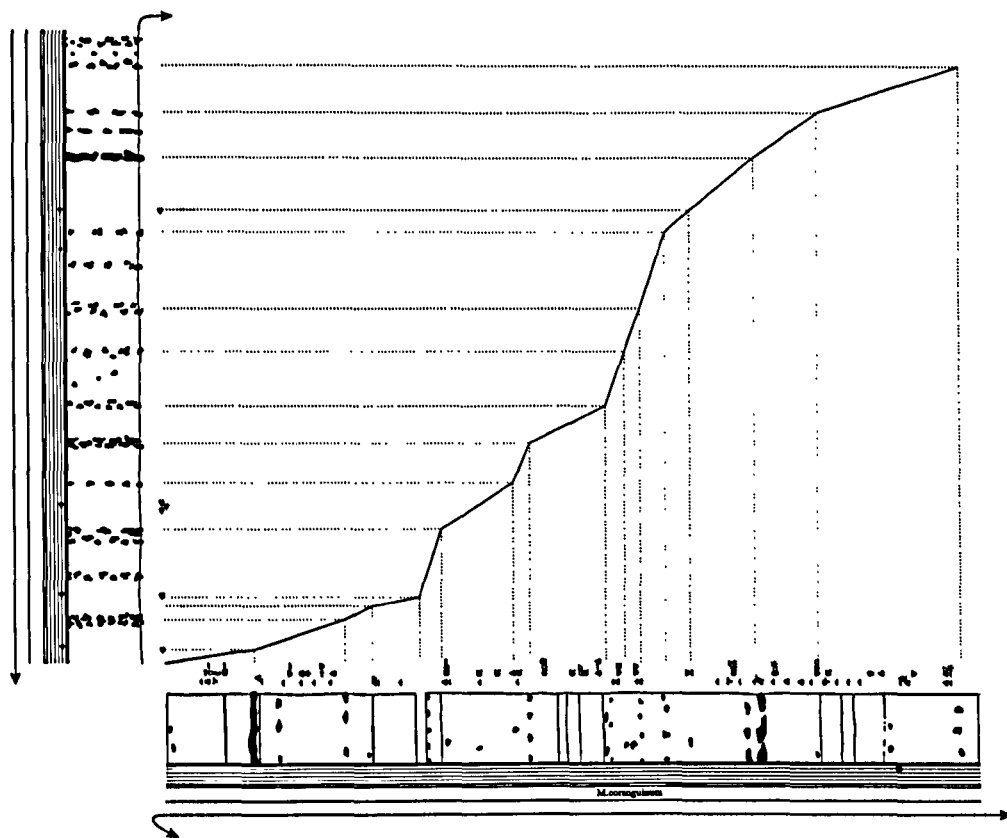


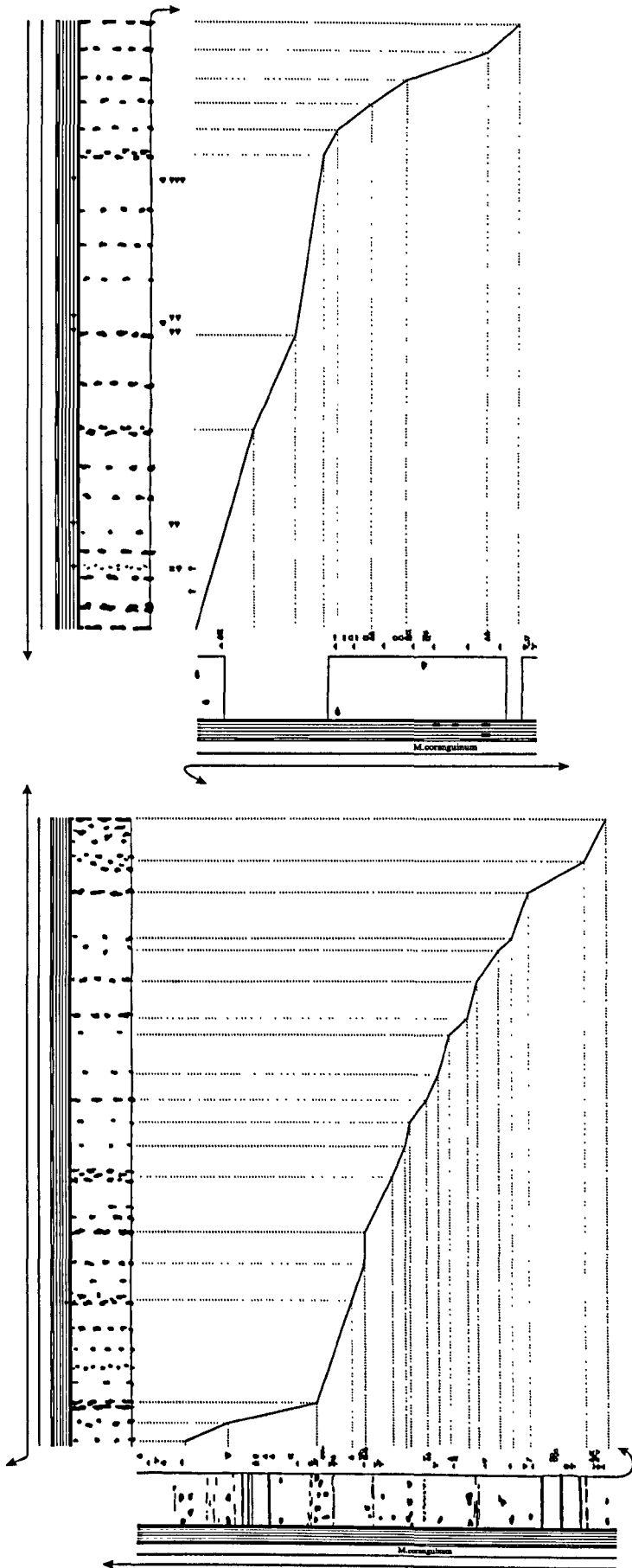


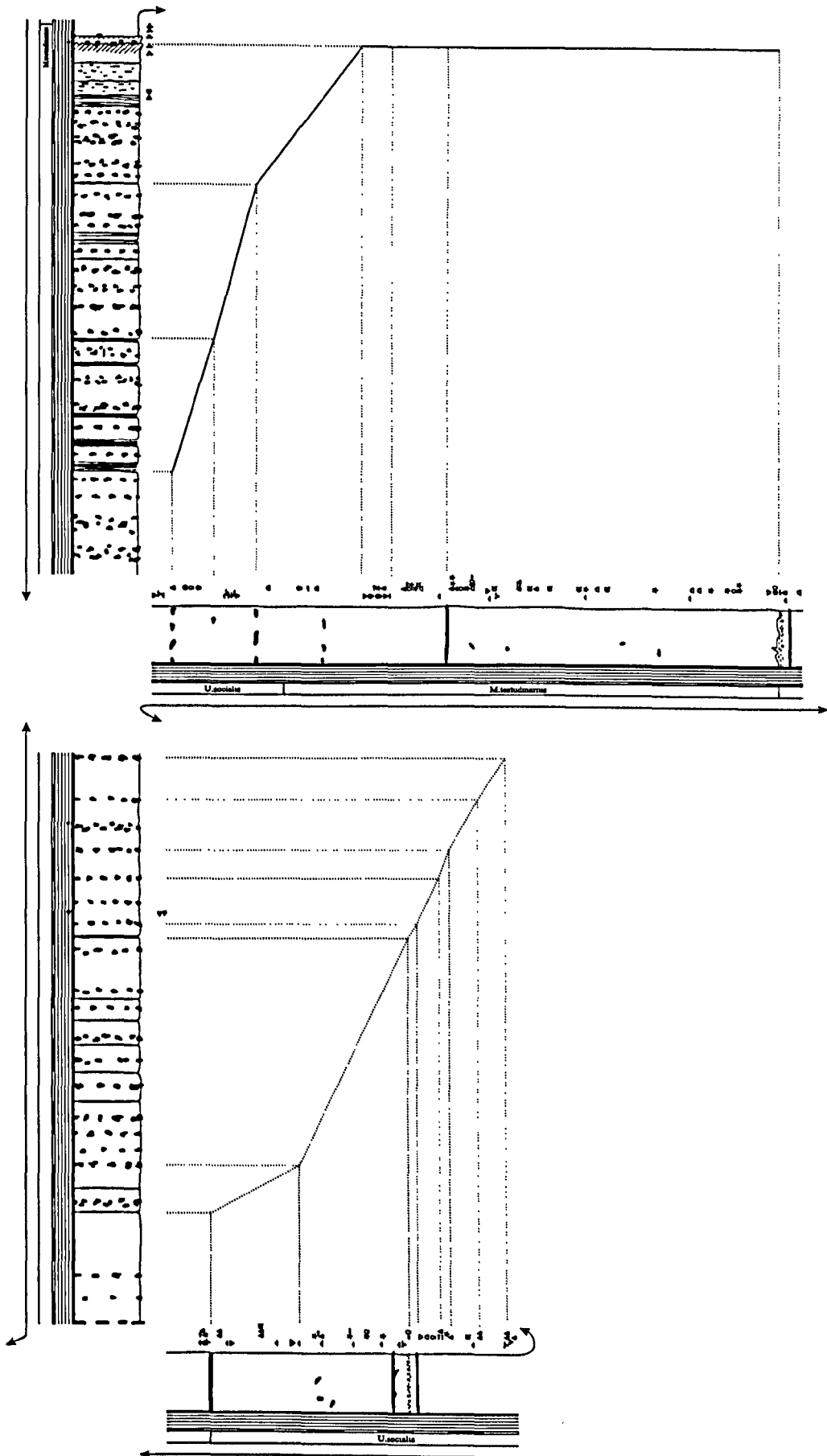


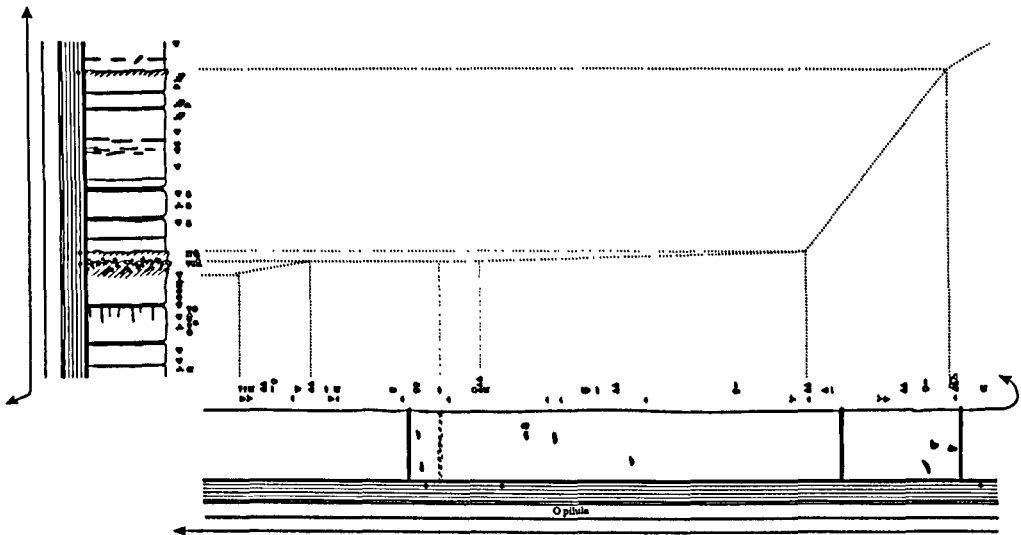
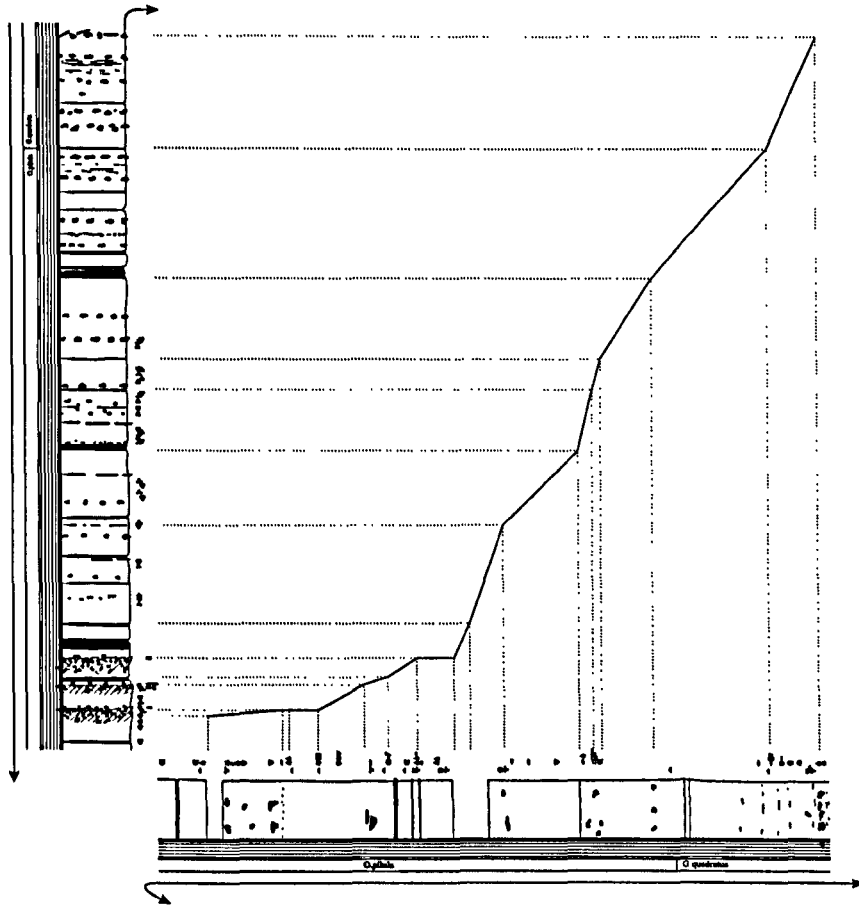


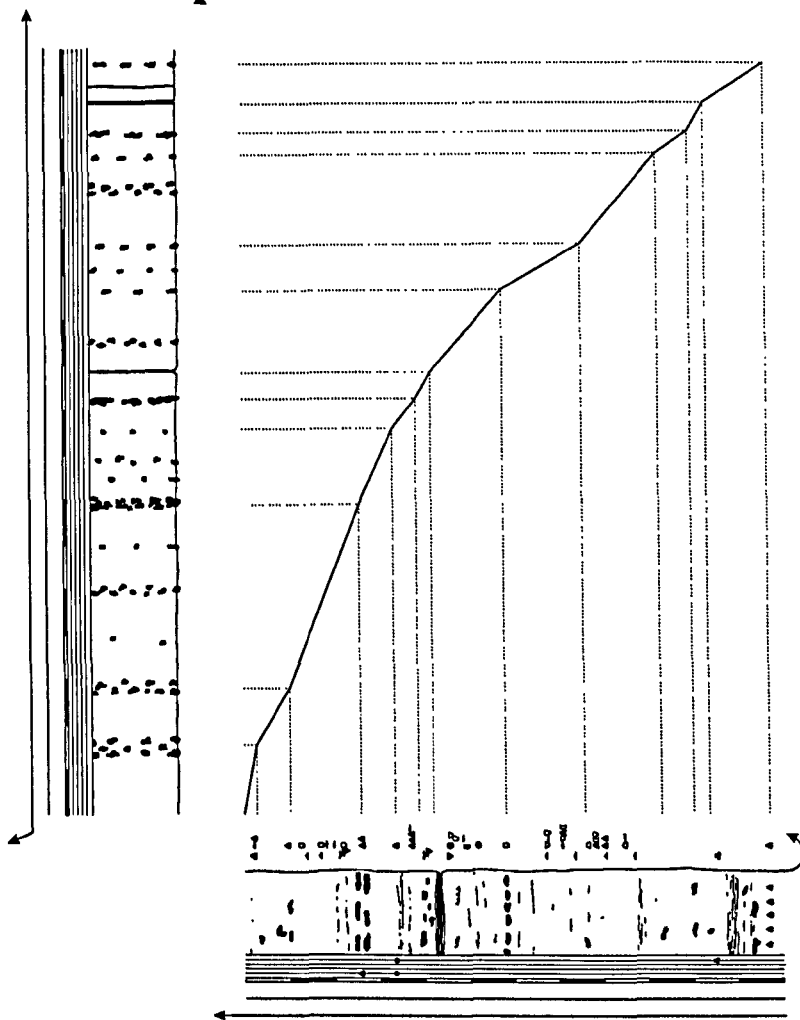
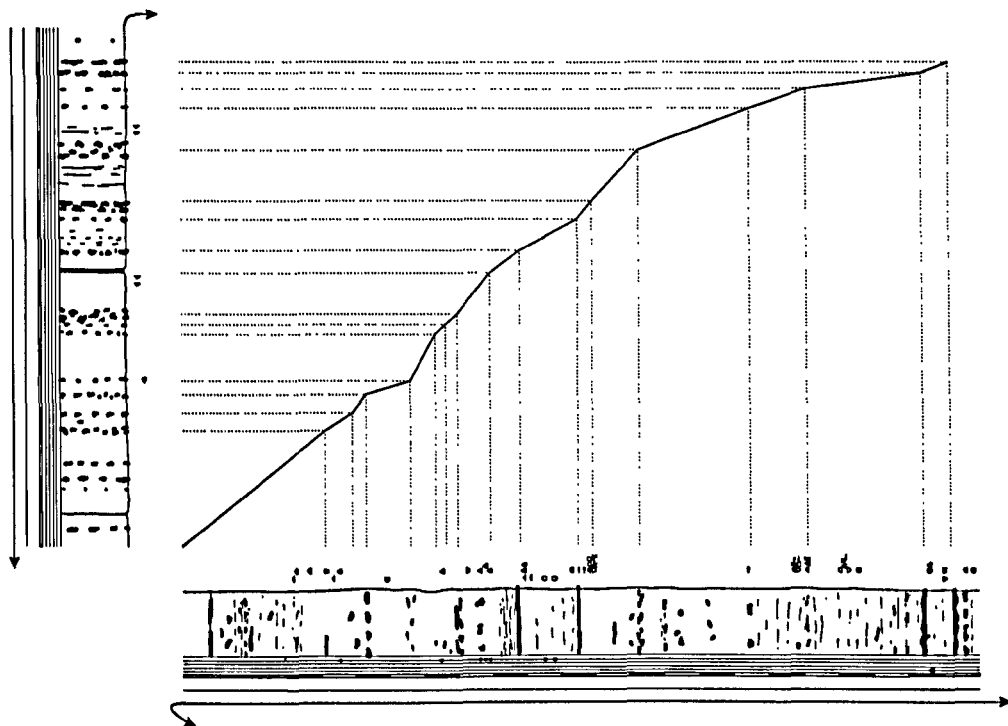


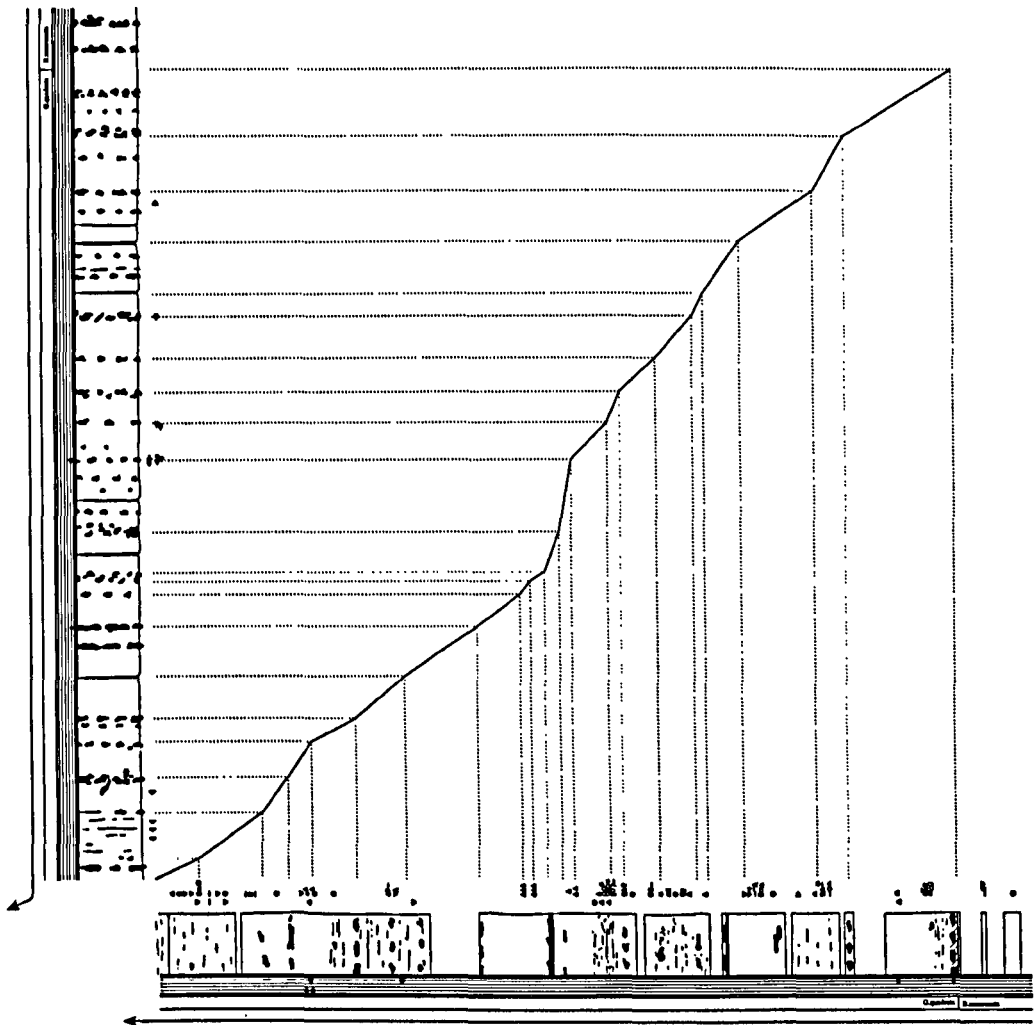


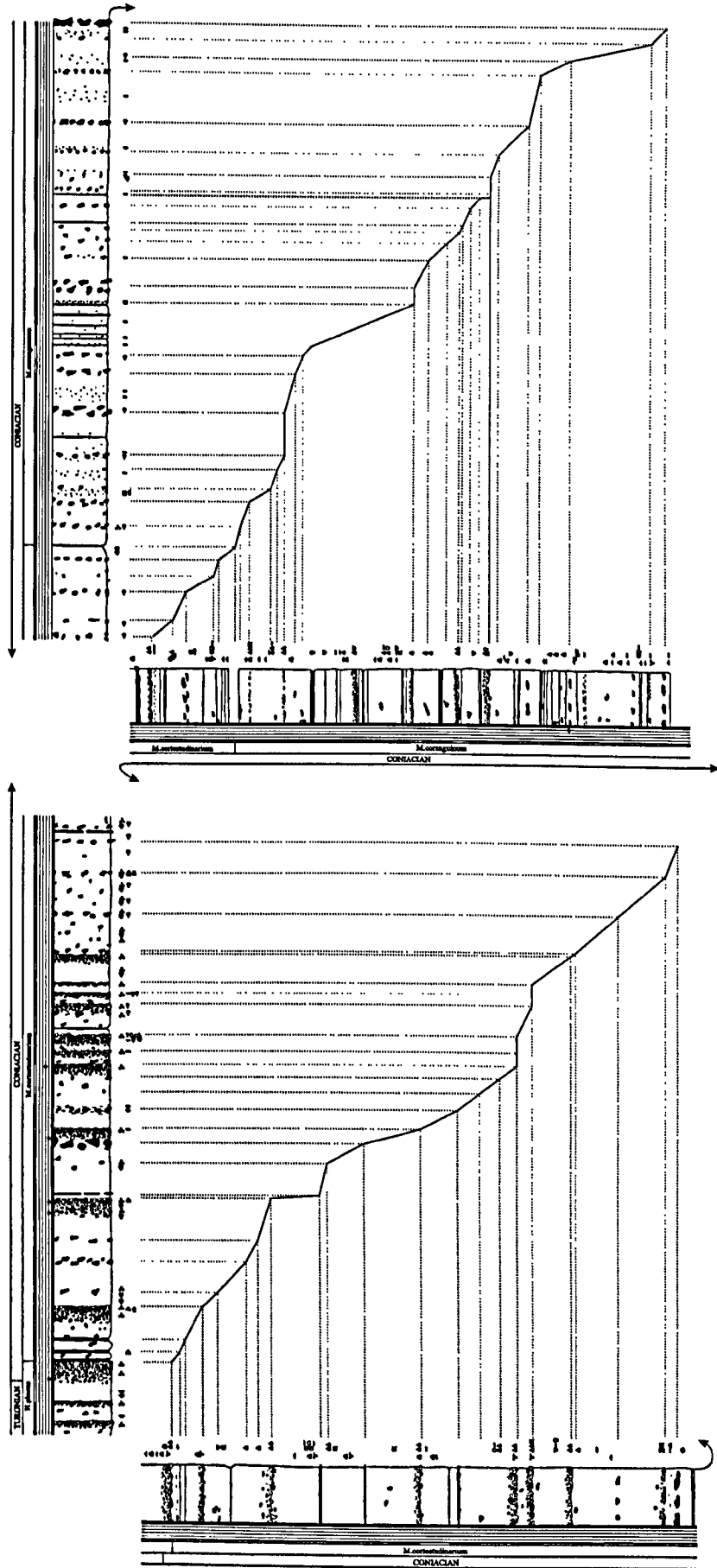


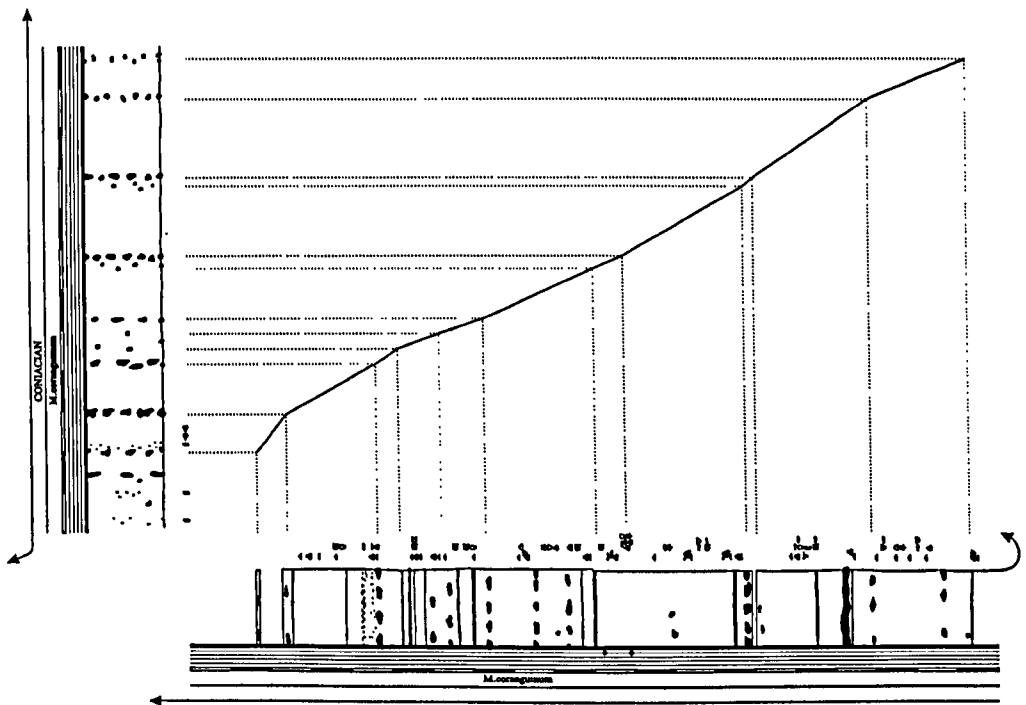
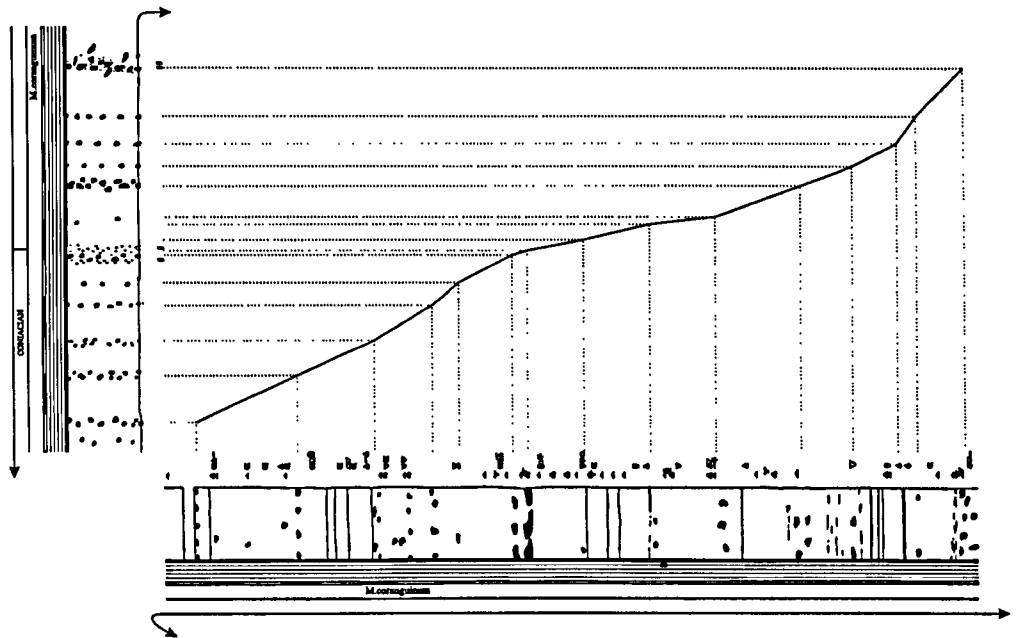


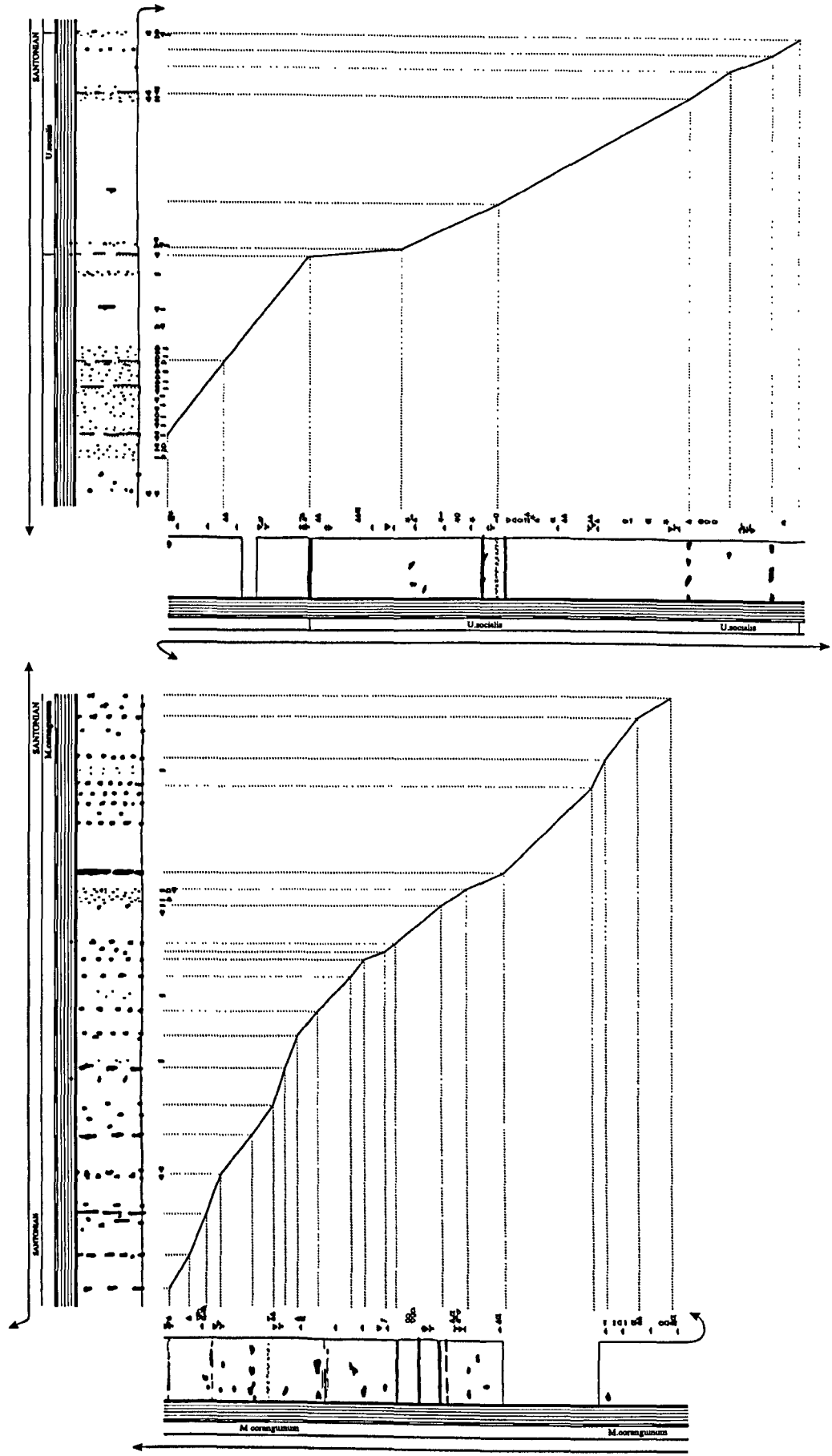


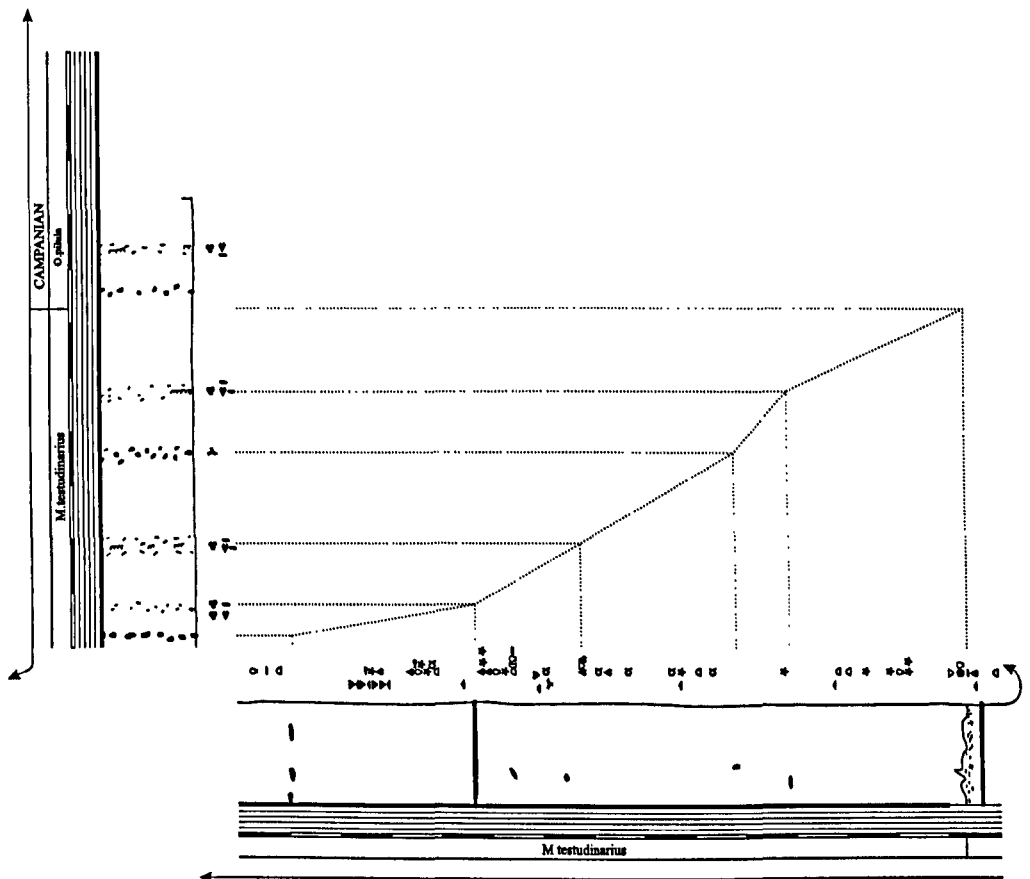


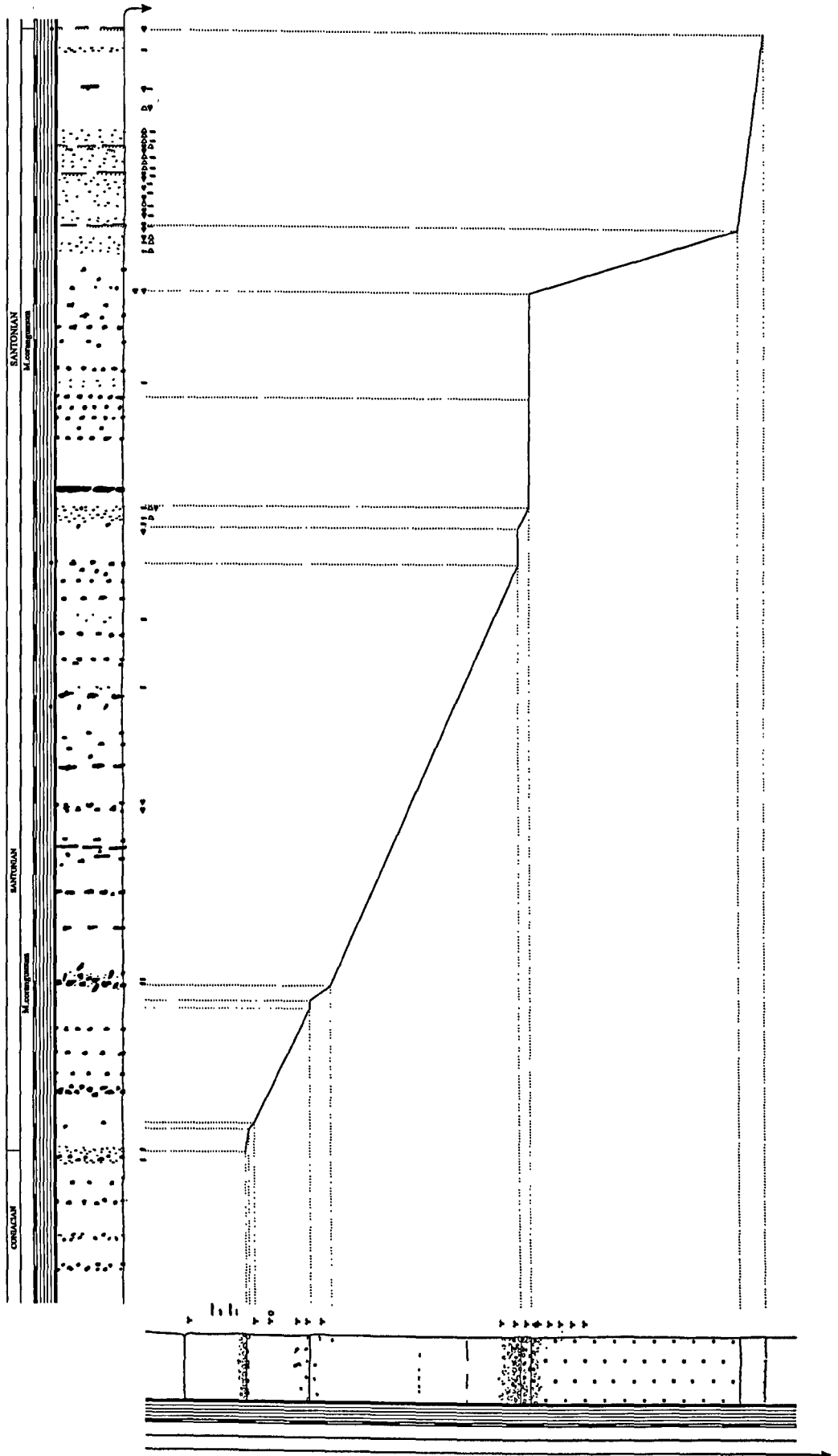


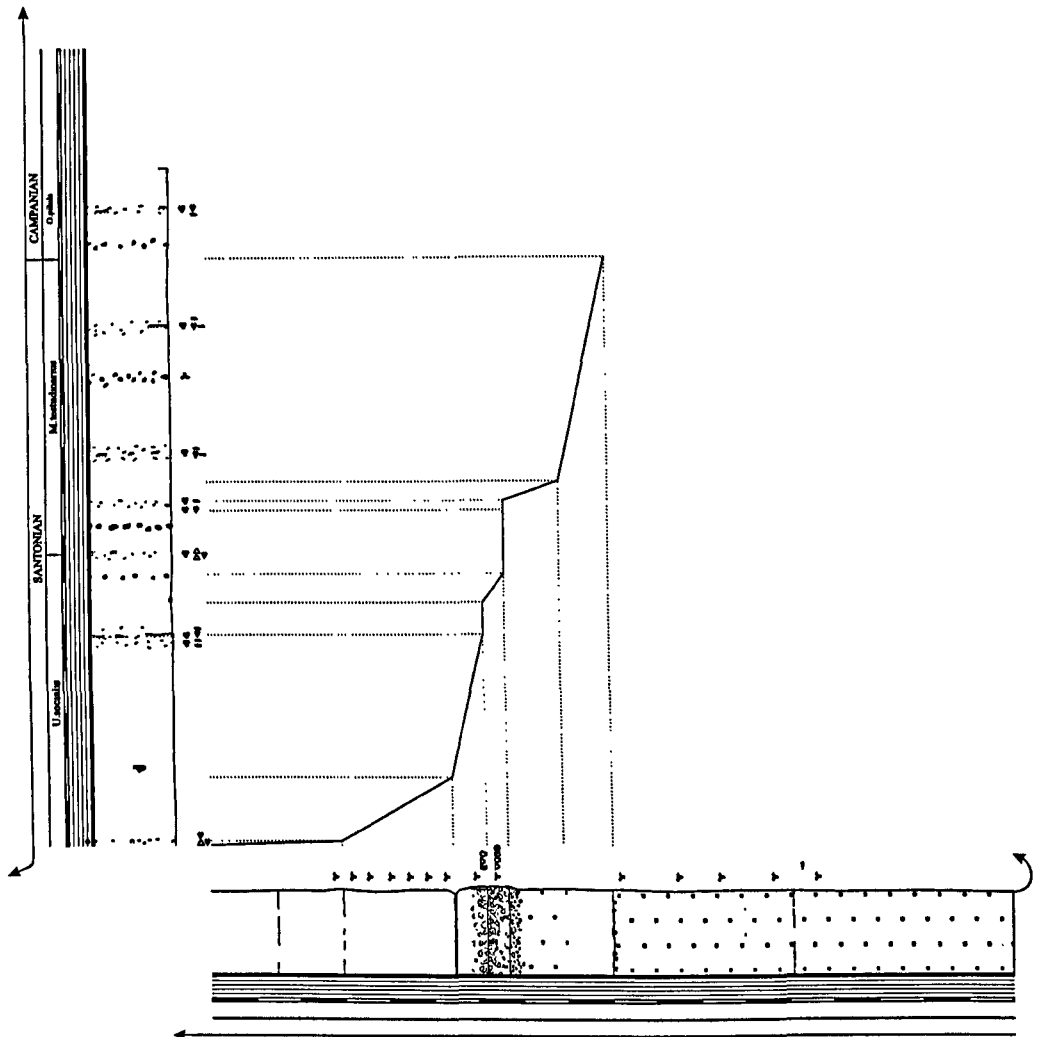


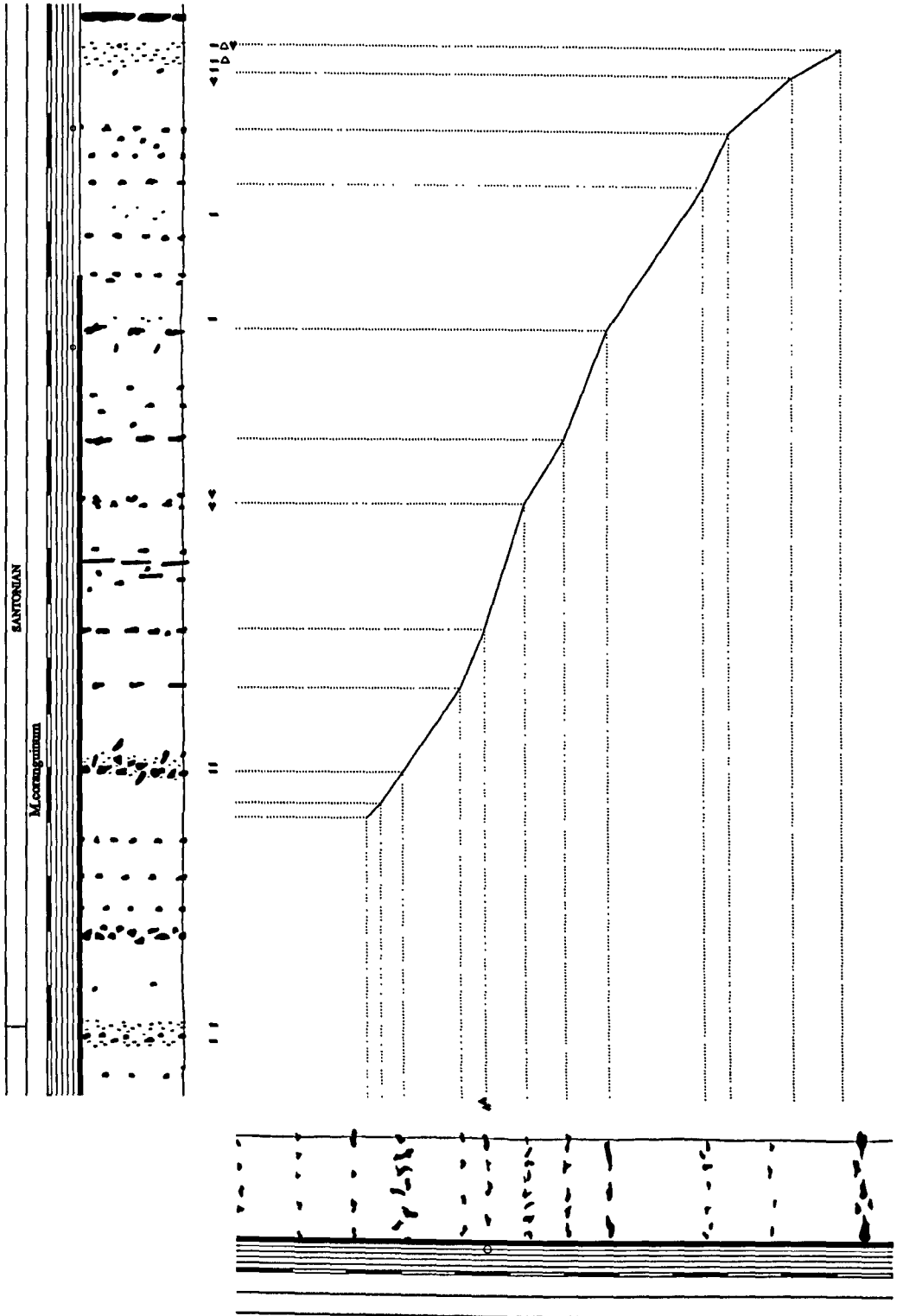


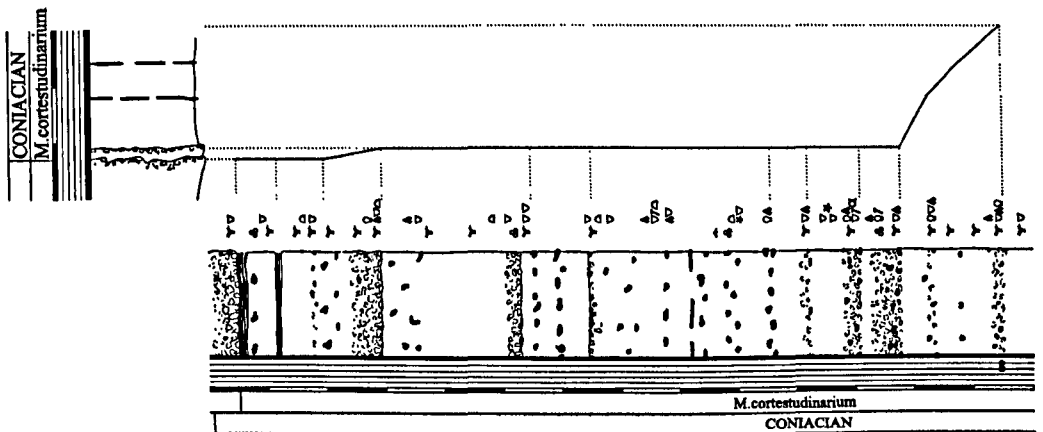


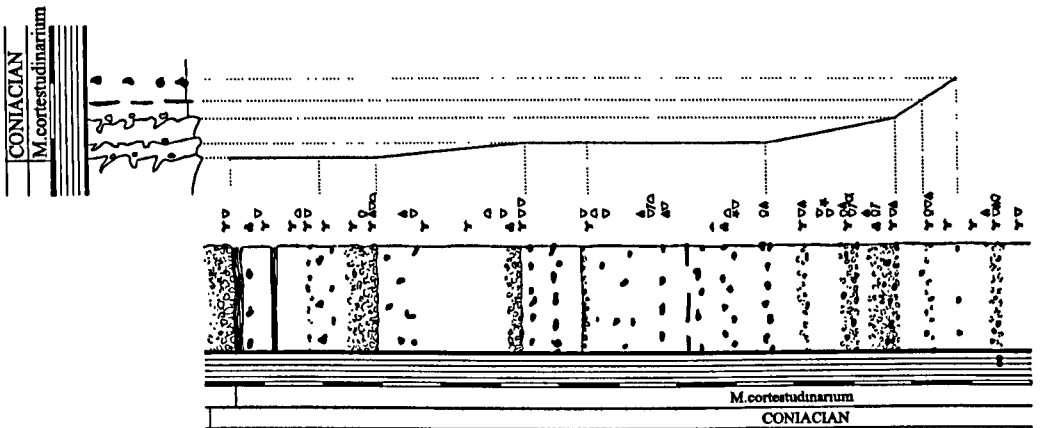


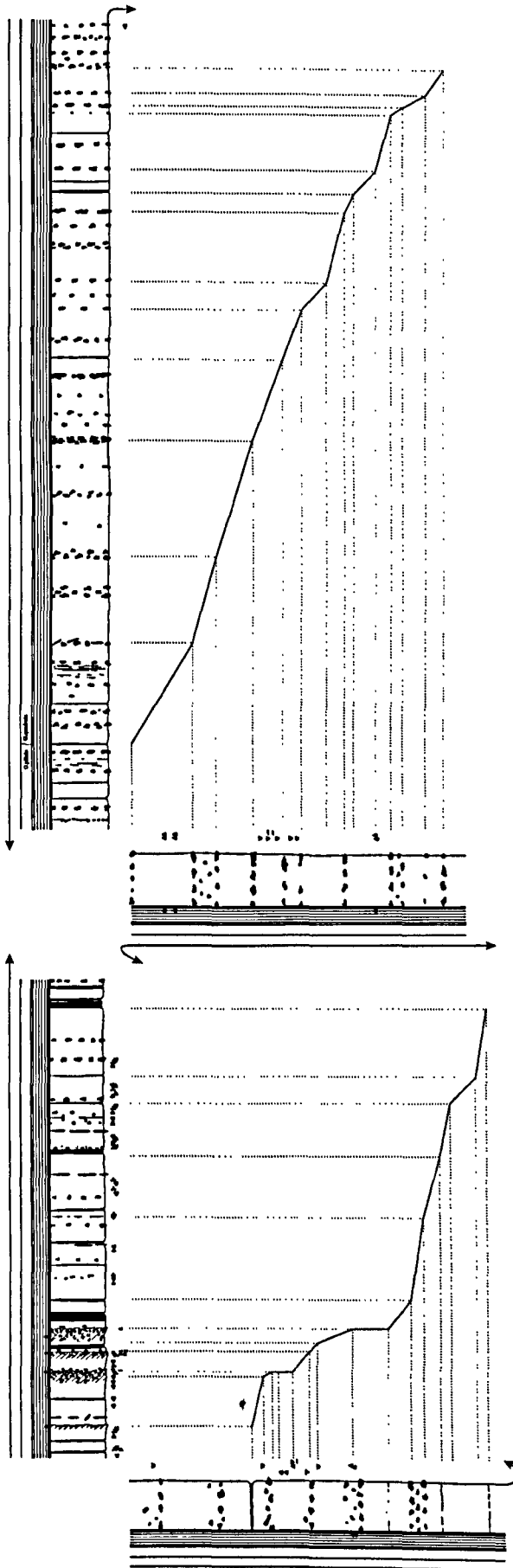


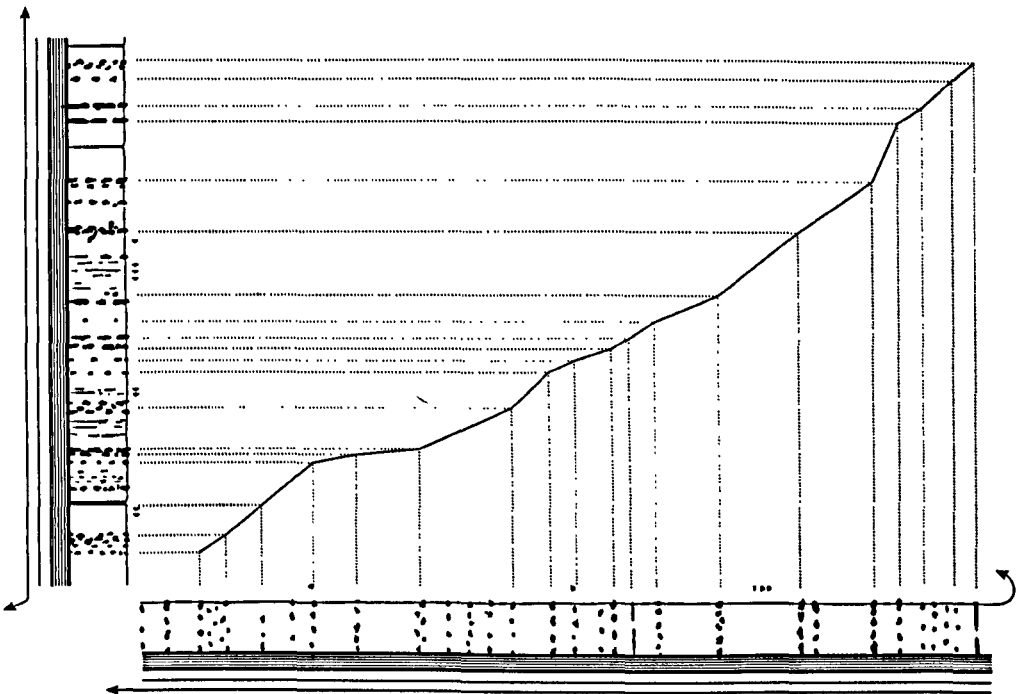
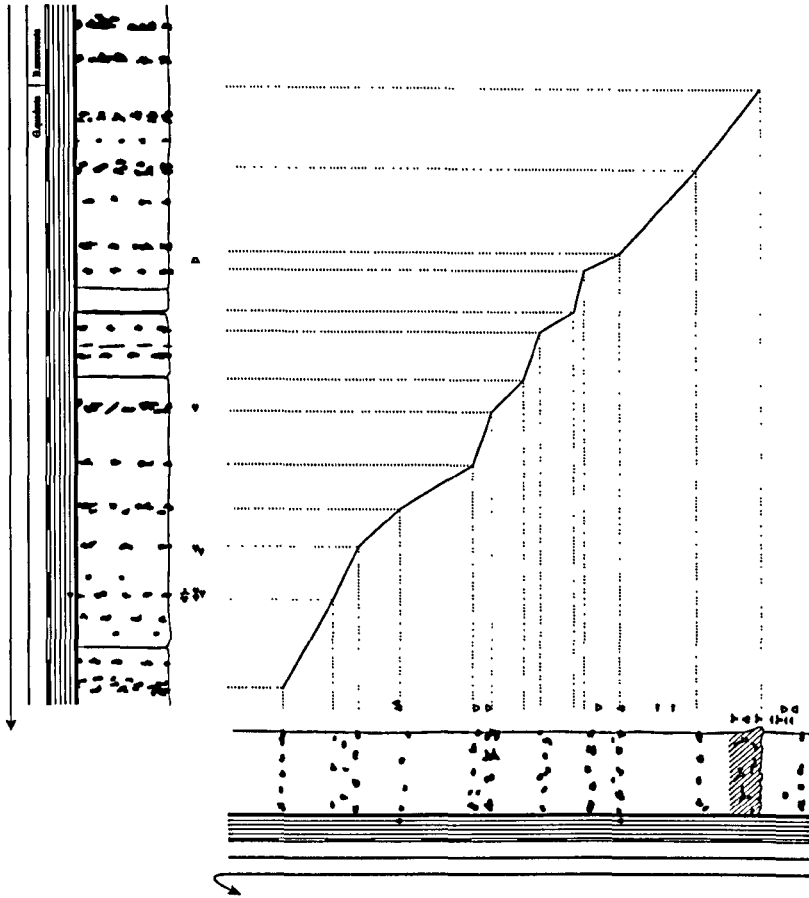


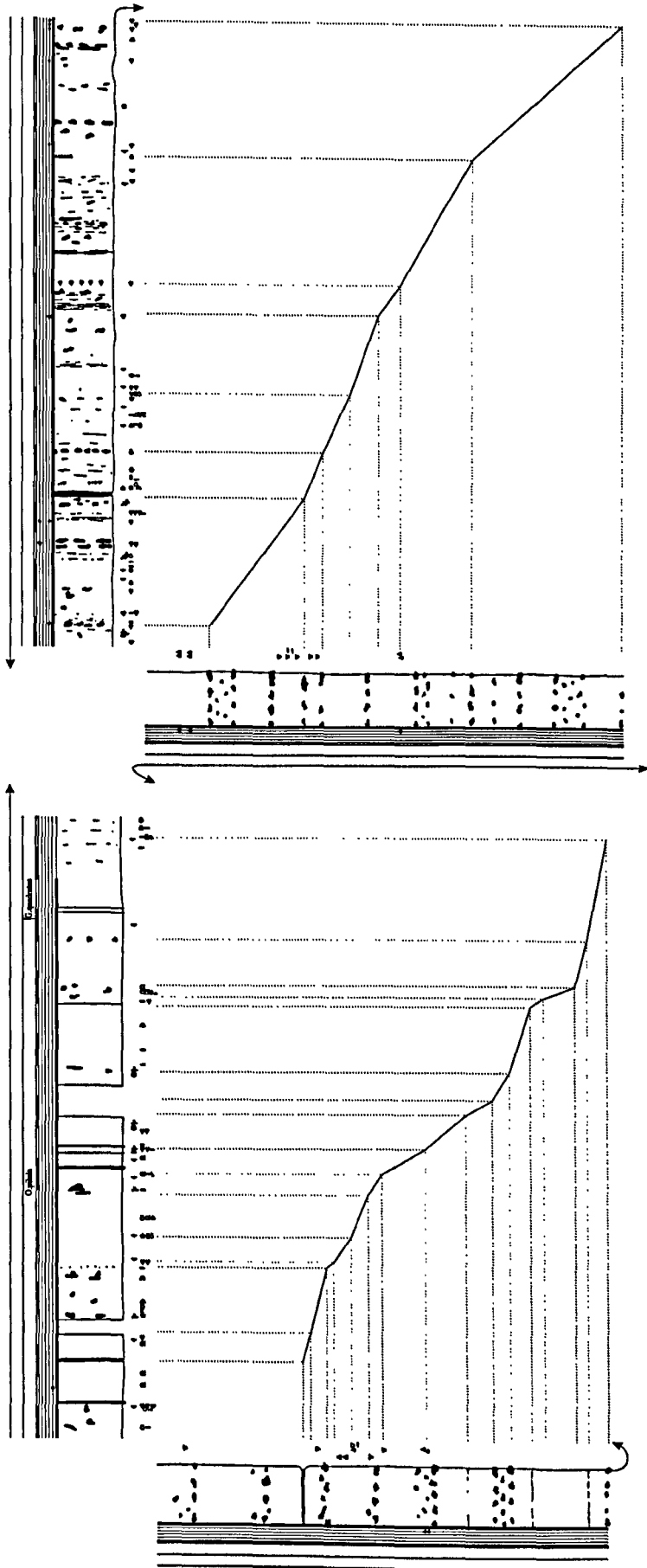


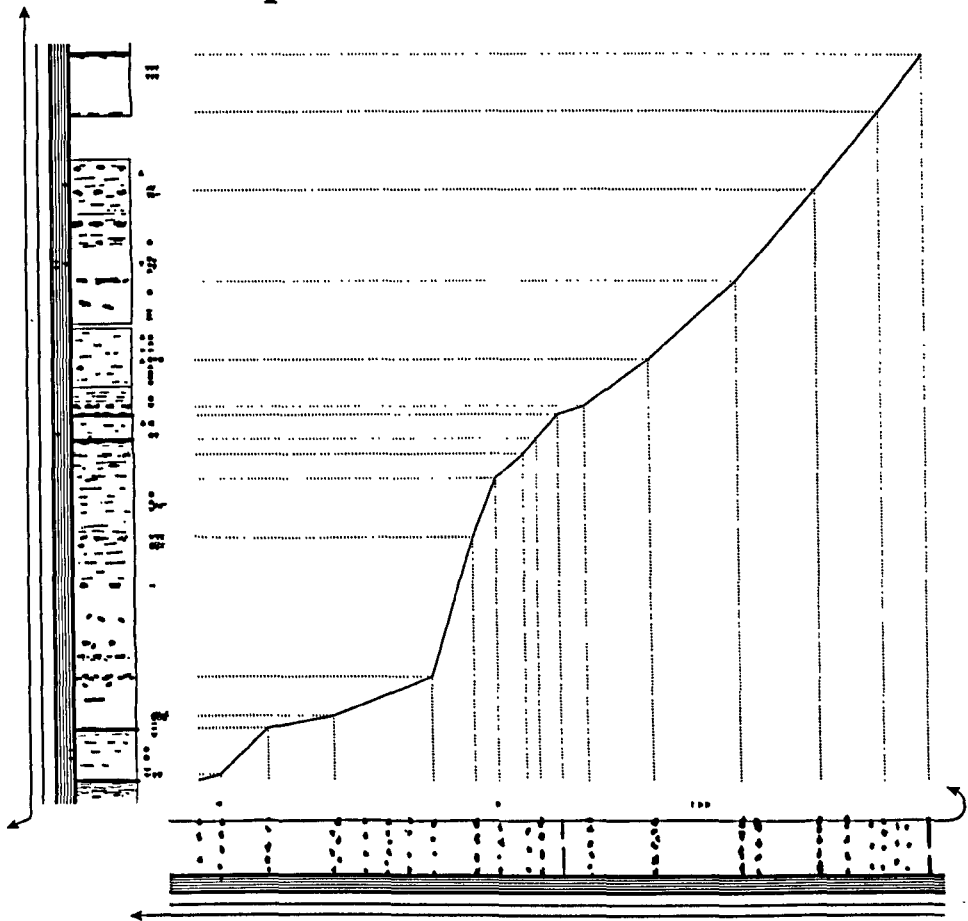
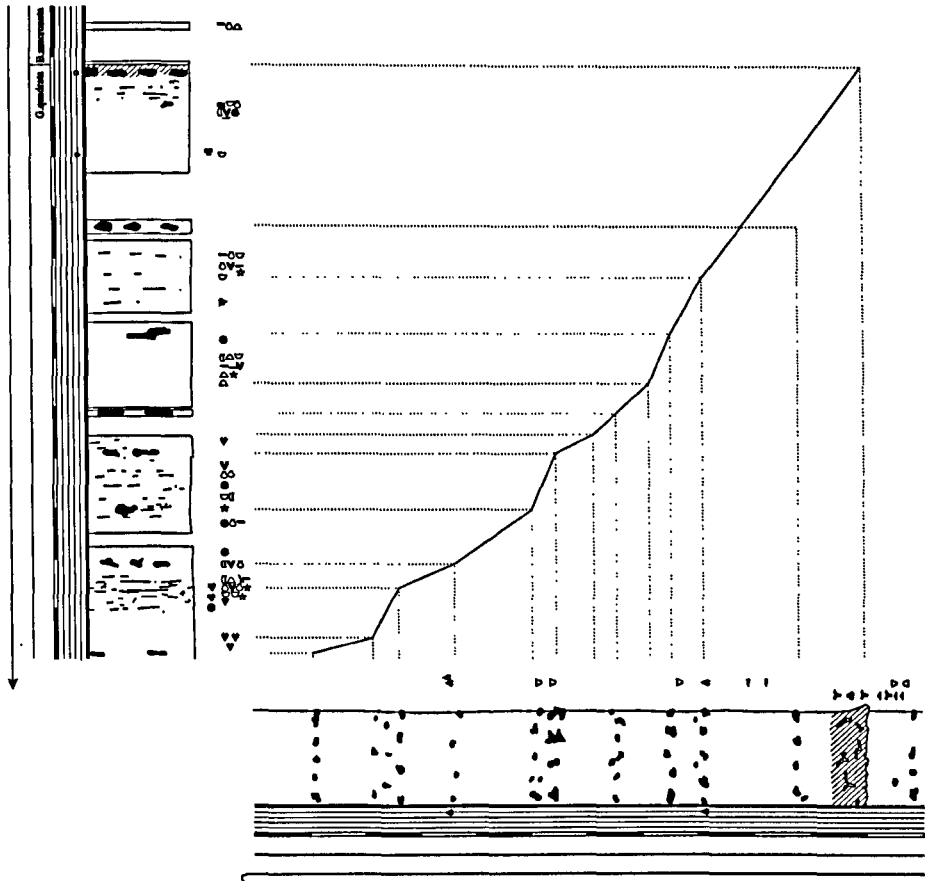


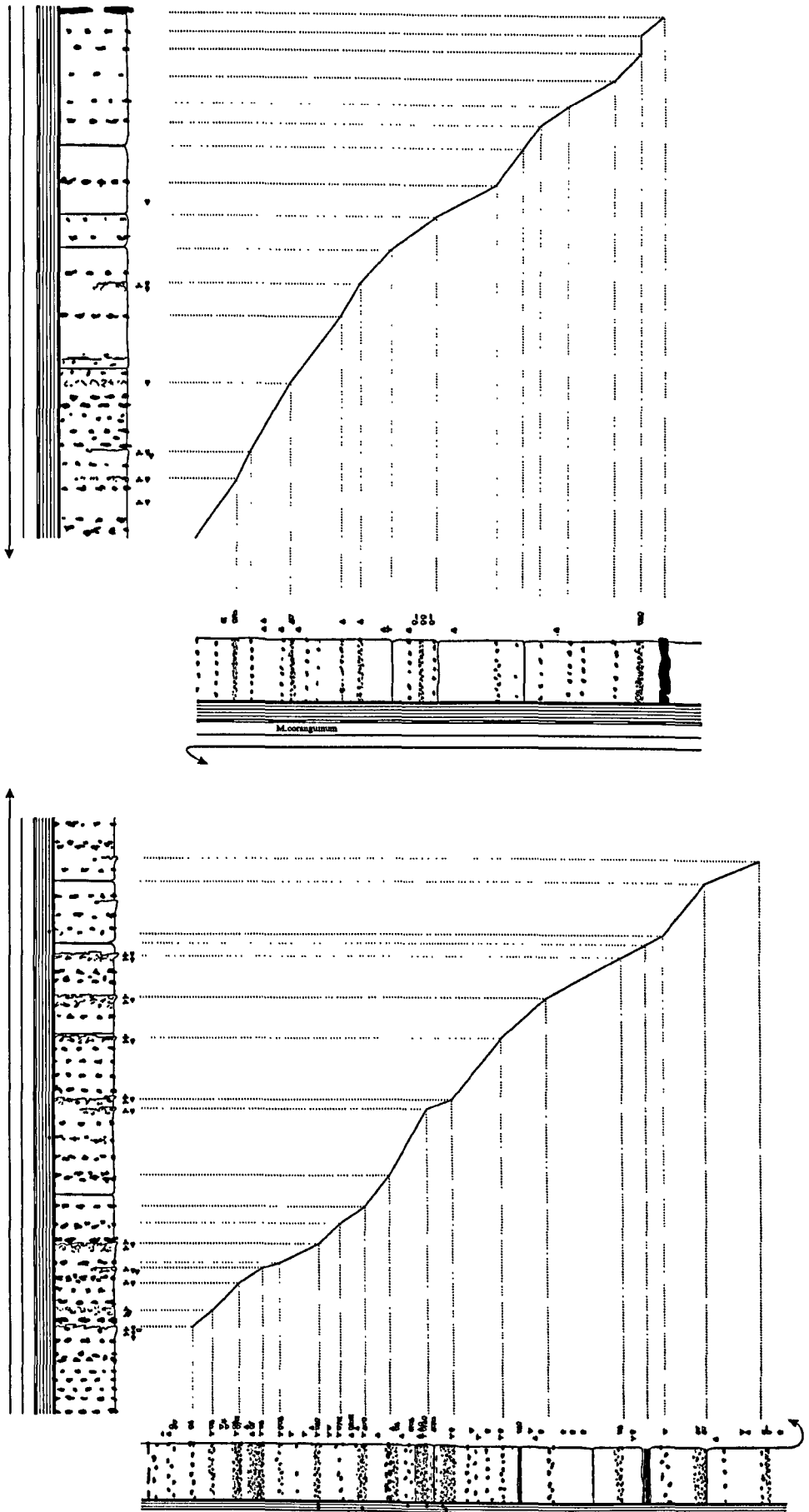


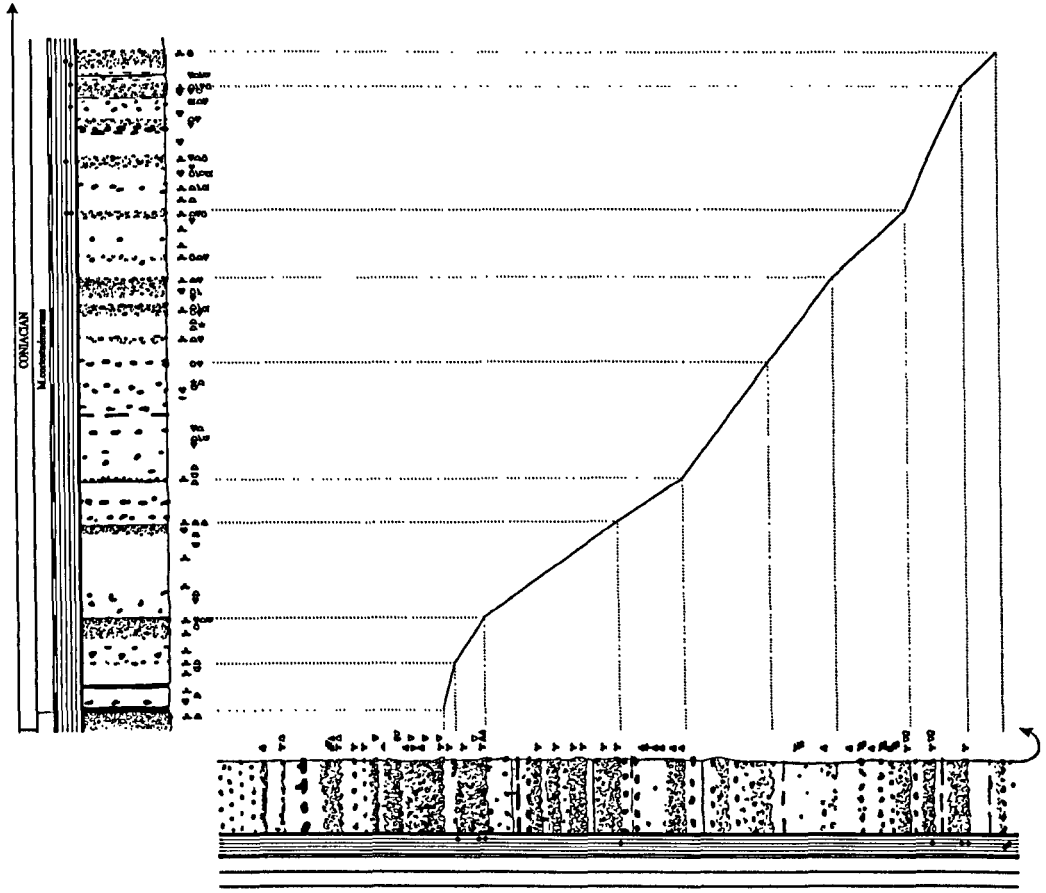
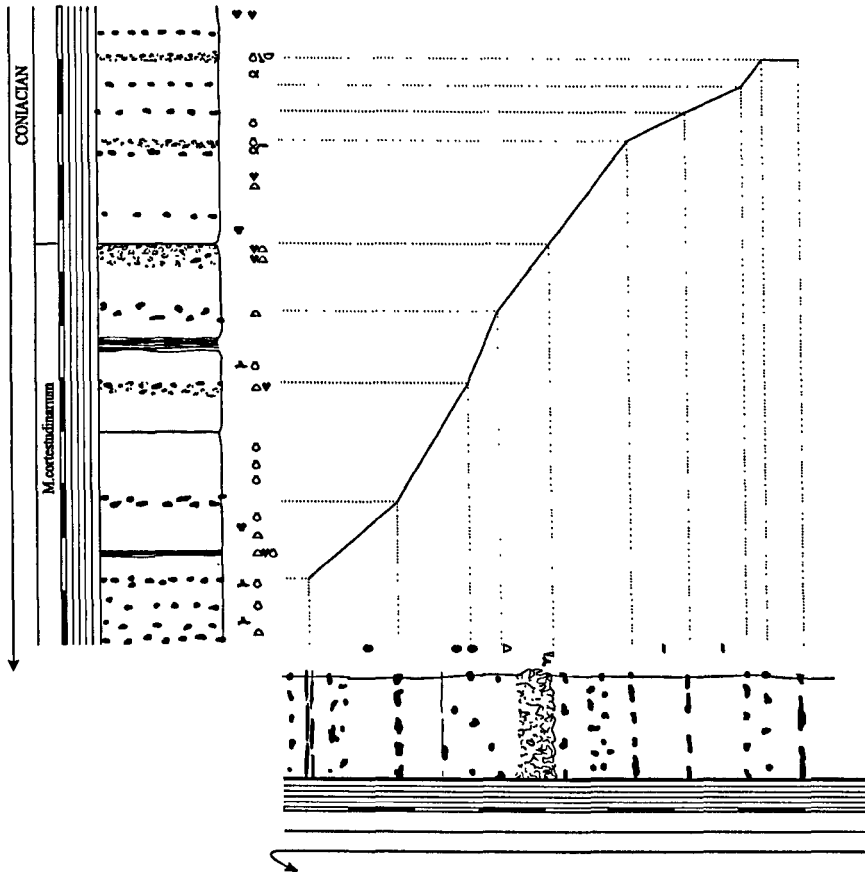


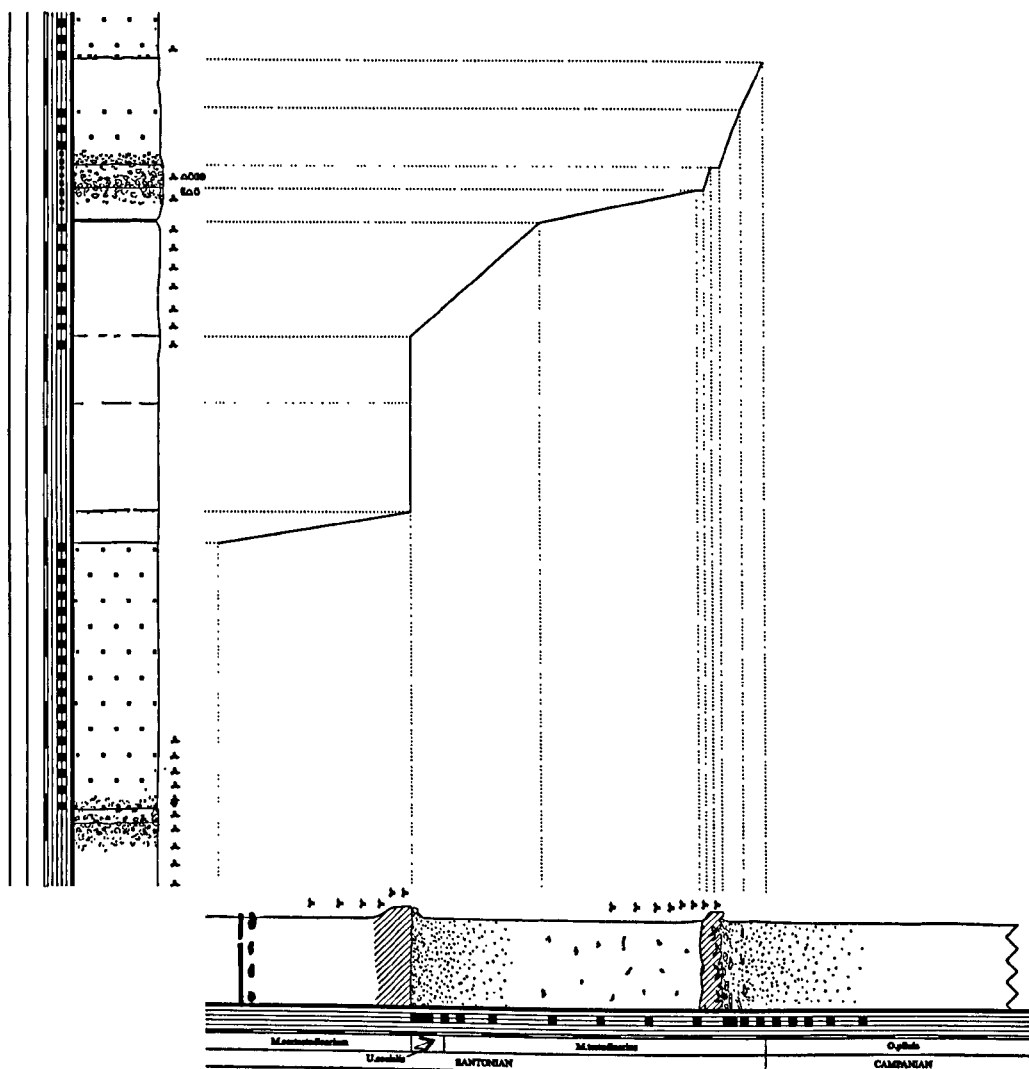


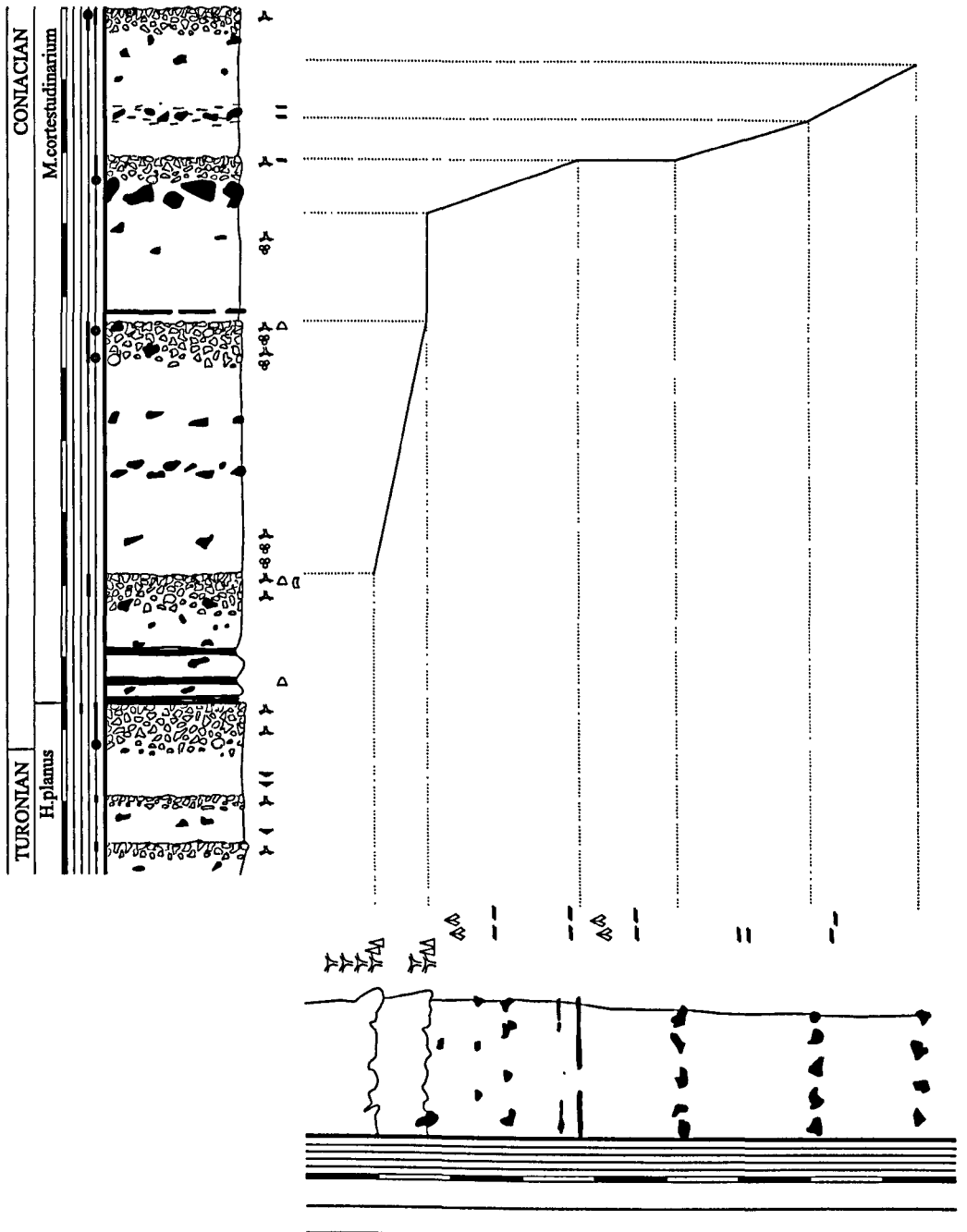












Appendix C

ICP-MS Data

	Chondrite REE (ppm)	SCO-1 REE (ppm)
La	0.31	29.613
Ce	0.81	56.731
Pr	0.12	6.9956
Nd	0.6	27.425
Sm	0.2	5.1773
Eu	0.07	1.1431
Gd	0.26	4.7624
Tb	0.05	0.6814
Dy	0.32	3.9283
Ho	0.07	0.7793
Er	0.21	2.22
Tm	0.03	0.3602
Yb	0.21	2.1895
Lu	0.03	0.361

REE DATA:

ppm	h8	H43(2)	H43(4)	H43(5)	H39	H38	CC104	CC107	CC110	CC109	H52	H53	H64	H65	H66
La 139	9.0164	6.4995	6.7145	6.4456	10.5023	8.5281	16.5204	15.1093	10.7644	15.0381	2.3169	2.7142	2.8561	4.5418	5.4999
Ce 140	8.1177	4.0056	4.1069	3.915	10.9994	6.5338	17.8303	14.6075	10.2285	13.3127	1.1588	1.391	1.7908	3.318	4.7022
Pr 141	1.6989	1.0642	1.1115	1.0631	2.2079	1.5418	3.3656	3.0943	2.191	2.9226	0.3184	0.3953	0.4145	0.7438	0.9735
Nd 143	6.8466	4.2427	4.4256	4.234	8.808	5.9257	13.6093	13.0397	9.2531	12.3514	1.2962	1.6286	1.6682	3.051	3.88
Sm	1.1748	0.76245	0.7661	0.7573	1.6984	1.09655	2.4998	2.4372	1.71695	2.26485	0.21805	0.261	0.2993	0.54365	0.6856
Eu 151	0.2705	0.166	0.1698	0.1727	0.279	0.2419	0.5368	0.5235	0.3741	0.5119	0.0514	0.063	0.0684	0.1172	0.1545
Gd 157	1.2659	0.827	0.8815	0.8145	1.8397	1.1055	2.6373	2.6441	1.9307	2.6276	0.2749	0.3389	0.3589	0.6091	0.7606
Tb 159	0.1741	0.1175	0.1233	0.1121	0.2502	0.1595	0.3714	0.3431	0.2572	0.3453	0.0383	0.0458	0.0515	0.0887	0.1055
Dy	0.99565	0.66605	0.70095	0.66465	1.45925	0.9286	2.10235	1.90075	1.463	1.92195	0.24915	0.2861	0.32745	0.5262	0.6044
Ho 165	0.2033	0.1422	0.1463	0.1387	0.2791	0.1778	0.4171	0.3791	0.2956	0.3889	0.0541	0.0633	0.0729	0.1084	0.127
Er	0.5613	0.35755	0.37725	0.35225	0.72275	0.4761	1.0427	0.94475	0.72555	0.97675	0.161	0.1796	0.2033	0.3009	0.34
Tm 169	0.0847	0.0536	0.0554	0.0528	0.1069	0.0691	0.149	0.1251	0.0945	0.1218	0.0242	0.0296	0.0305	0.043	0.049
Yb	0.4559	0.30055	0.30305	0.29865	0.58165	0.37345	0.75735	0.6212	0.4698	0.6071	0.144	0.16745	0.16635	0.2352	0.2647
Lu 175	0.0668	0.0457	0.0441	0.045	0.0897	0.056	0.1144	0.0916	0.0696	0.0893	0.0231	0.0247	0.0245	0.0334	0.0383

REE DATA:

ppm	CC46	CC47	CC69	CC71	cc56	cc103	cc57	cc102	cc101	cc61	cc63	cc64	cc66	cc68	cc72
La 139	10.2808	12.2873	12.945	11.7289	10.9861	10.5252	15.0814	14.3963	19.6981	27.7894	24.7042	17.2056	11.4193	4.2539	22.4806
Ce 140	9.7118	12.6242	10.7073	10.2445	11.7323	12.7359	13.0219	12.3791	14.1889	21.3417	17.1109	17.0782	10.2356	3.0972	18.9353
Pr 141	2.1566	2.5907	2.2266	2.1973	2.0905	2.1736	2.6971	2.5294	3.1312	4.4536	3.7462	3.2816	2.0979	0.6332	4.0955
Nd 143	9.2063	10.8732	9.2003	9.0491	8.3333	8.7408	10.9944	10.4177	13.053	19.0197	15.6956	13.4906	8.4432	2.598	17.0321
Sm	1.6928	1.98725	1.64995	1.6541	1.5753	1.6355	2.056	1.8904	2.3069	3.4607	2.88565	2.511	1.56425	0.4353	3.0935
Eu 151	0.3923	0.4246	0.3628	0.3578	0.3404	0.355	0.4467	0.4289	0.5345	0.794	0.6819	0.5418	0.3407	0.1012	0.6787
Gd 157	1.9053	2.1181	1.8771	1.8383	1.6727	1.6694	2.2897	2.1952	2.9049	4.3126	3.6845	2.8066	1.7965	0.5522	3.6891
Tb 159	0.2508	0.2758	0.2503	0.2474	0.2284	0.2295	0.3258	0.306	0.407	0.5873	0.502	0.376	0.2412	0.0865	0.4684
Dy	1.3939	1.4855	1.4525	1.41985	1.3155	1.2626	1.85045	1.8367	2.44555	3.5915	3.1495	2.1498	1.38145	0.46185	2.64175
Ho 165	0.2652	0.2837	0.2972	0.2878	0.2668	0.2592	0.391	0.3943	0.549	0.794	0.7075	0.4376	0.2814	0.0986	0.5376
Er	0.6619	0.71875	0.77385	0.7243	0.7038	0.7029	1.04095	1.0574	1.4588	2.13975	1.96975	1.16225	0.74505	0.2682	1.36635
Tm 169	0.0818	0.0944	0.1043	0.096	0.1006	0.1012	0.145	0.1433	0.2048	0.2975	0.2656	0.1558	0.1023	0.0388	0.1751
Yb	0.40315	0.48715	0.5409	0.46735	0.5676	0.57365	0.70335	0.7235	1.0215	1.53195	1.3396	0.8211	0.52505	0.21035	0.8855
Lu 175	0.0553	0.0698	0.0768	0.0679	0.0834	0.0833	0.1081	0.1128	0.1525	0.2341	0.2054	0.1195	0.0794	0.0323	0.1282

REE DATA:

ppm	cc73a	cc76a	cc73b	cc74b	cc78	cc81	cc82	cc83	h69	h75	h85	h82	cc(56)2	cc73a1
La	139 18.8609	17.8926	15.2049	15.0841	4.216	21.2363	18.076	17.8157	7.4436	9.7691	7.0283	10.3633	12.7695	22.754
Ce	140 16.9009	16.3427	15.953	16.6836	3.3824	24.1885	21.0731	19.8377	6.0335	9.3308	5.4846	11.9742	13.2252	19.9536
Pr	141 3.4742	3.4551	3.0732	3.0916	0.6678	4.4729	3.7278	3.729	1.246	1.7771	1.1237	2.0893	2.4377	4.1588
Nd	143 14.1311	14.1334	12.6573	12.5386	2.7057	18.457	15.39	15.1506	4.97	7.2548	4.4477	8.2828	9.8067	16.9942
Sm	2.5327	2.5585	2.42195	2.36435	0.4861	3.5528	2.88345	2.84975	0.8984	1.29095	0.8126	1.56165	1.8585	3.06095
Eu	151 0.5391	0.5458	0.5356	0.5206	0.1084	0.7754	0.609	0.5999	0.1947	0.2849	0.1641	0.2384	0.4029	0.6405
Gd	157 2.8908	2.9003	2.7276	2.5257	0.5555	3.8046	3.0322	3.0133	1.0171	1.3605	0.8919	1.63	2.0154	3.4617
Tb	159 0.3854	0.3848	0.3581	0.3458	0.0775	0.5048	0.3952	0.3985	0.1359	0.1908	0.1216	0.2276	0.2726	0.452
Dy	2.1676	2.15705	1.983	1.8434	0.4643	2.7554	2.23515	2.17185	0.80195	1.1055	0.7273	1.32075	1.53585	2.5554
Ho	165 0.4476	0.4321	0.3881	0.3666	0.0966	0.5374	0.4299	0.4196	0.163	0.2211	0.1466	0.2561	0.3091	0.5076
Er	1.1798	1.105	0.9754	0.91435	0.2534	1.3556	1.075	1.04515	0.43945	0.5837	0.4008	0.68645	0.7811	1.2908
Tm	169 0.1586	0.1499	0.1298	0.1273	0.0364	0.1734	0.1413	0.1405	0.0627	0.0872	0.0576	0.1023	0.1089	0.1726
Yb	0.8132	0.75145	0.66485	0.696	0.20655	0.90105	0.76185	0.74015	0.34305	0.4708	0.31635	0.5607	0.59035	0.86625
Lu	175 0.1186	0.1092	0.0976	0.0982	0.0292	0.1283	0.1125	0.1046	0.0511	0.0715	0.0456	0.0826	0.0844	0.1283

Chondrite normalised REE data:

	h8	H38	H39	H43(2)	H43(4)	H43(5)	H52	H53	H64	H65	H66	h69	h75	h82	h85
La	29.08516	27.51	33.87839	20.96613	21.65968	20.79226	7.473871	8.7554839	9.2132258	14.650968	17.741613	24.011613	31.513226	33.43	22.671935
Ce	10.02185	8.06642	13.57951	4.945185	5.070247	4.833333	1.430617	1.717284	2.2108642	4.0962963	5.8051852	7.4487654	11.519506	14.782963	6.7711111
Pr	14.1575	12.84833	18.39917	8.868333	9.2625	8.859167	2.653333	3.2941667	3.4541667	6.1983333	8.1125	10.383333	14.809167	17.410833	9.3641667
Nd	11.411	9.876167	14.68	7.071167	7.376	7.056667	2.160333	2.7143333	2.7803333	5.085	6.4666667	8.2833333	12.091333	13.804667	7.4128333
Sm	5.874	5.48275	8.492	3.81225	3.8305	3.7865	1.09025	1.305	1.4965	2.71825	3.428	4.492	6.45475	7.80825	4.063
Eu	3.864286	3.455714	3.985714	2.371429	2.425714	2.467143	0.734286	0.9	0.9771429	1.6742857	2.2071429	2.7814286	4.07	3.4057143	2.3442857
Gd	4.868846	4.251923	7.075769	3.180769	3.390385	3.132692	1.057308	1.3034615	1.3803846	2.3426923	2.9253846	3.9119231	5.2326923	6.2692308	3.4303846
Tb	3.482	3.19	5.004	2.35	2.466	2.242	0.766	0.916	1.03	1.774	2.11	2.718	3.816	4.552	2.432
Dy	3.111406	2.901875	4.560156	2.081406	2.190469	2.077031	0.778594	0.8940625	1.0232813	1.644375	1.88875	2.5060938	3.4546875	4.1273438	2.2728125
Ho	2.904286	2.54	3.987143	2.031429	2.09	1.981429	0.772857	0.9042857	1.0414286	1.5485714	1.8142857	2.3285714	3.1585714	3.6585714	2.0942857
Er	2.672857	2.267143	3.441667	1.702619	1.796429	1.677381	0.766667	0.8552381	0.9680952	1.4328571	1.6190476	2.092619	2.7795238	3.2688095	1.9085714
Tm	2.823333	2.303333	3.563333	1.786667	1.846667	1.76	0.806667	0.9866667	1.0166667	1.4333333	1.6333333	2.09	2.9066667	3.41	1.92
Yb	2.170952	1.778333	2.769762	1.43119	1.443095	1.422143	0.685714	0.797381	0.7921429	1.12	1.2604762	1.6335714	2.2419048	2.67	1.5064286
Lu	2.226667	1.866667	2.99	1.523333	1.47	1.5	0.77	0.8233333	0.8166667	1.1133333	1.2766667	1.7033333	2.3833333	2.7533333	1.52

SCO-1 normalised REE data:

	h8	H38	H39	H43(2)	H43(4)	H43(5)	H52	H53	H64	H65	H66	h69	h75	h82	h85
La	0.30447	0.287981	0.354647	0.219478	0.226739	0.217658	0.078238	0.0916545	0.0964462	0.1533698	0.1857234	0.2513592	0.3298878	0.3499531	0.2373351
Ce	0.143091	0.115171	0.193886	0.070607	0.072392	0.06901	0.020426	0.0245191	0.0315664	0.0584863	0.0828856	0.1063524	0.1644739	0.211069	0.096677
Pr	0.242853	0.220396	0.315613	0.152124	0.158886	0.151967	0.045514	0.0565069	0.0592515	0.106324	0.1391589	0.178112	0.2540311	0.2986592	0.1606295
Nd	0.249644	0.216066	0.321162	0.1547	0.161369	0.154382	0.047263	0.0593829	0.0608268	0.1112472	0.1414747	0.1812189	0.2645285	0.302012	0.1621745
Sm	0.226914	0.2118	0.328047	0.147268	0.147973	0.146273	0.042117	0.0504124	0.0578101	0.1050065	0.1324242	0.1735267	0.2493481	0.3016341	0.1569544
Eu	0.236637	0.211618	0.244073	0.145219	0.148543	0.15108	0.044965	0.0551133	0.0598373	0.1025282	0.1351588	0.1703263	0.2492345	0.2085557	0.143557
Gd	0.265811	0.232131	0.386297	0.173652	0.185096	0.171027	0.057723	0.0711616	0.0753612	0.1278977	0.1597094	0.2135688	0.2856753	0.3422644	0.1872795
Tb	0.255503	0.234077	0.367185	0.172439	0.180951	0.164514	0.056208	0.0672146	0.0755797	0.1301732	0.1548283	0.1994423	0.2800117	0.3340182	0.1784561
Dy	0.253459	0.23639	0.371476	0.169554	0.178438	0.169197	0.063425	0.0728314	0.0833577	0.1339528	0.1538599	0.2041494	0.281423	0.3362184	0.1851461
Ho	0.260875	0.228153	0.358142	0.182471	0.187733	0.17798	0.069421	0.0812267	0.0935455	0.1390992	0.1629668	0.2091621	0.2837162	0.3286283	0.1881175
Er	0.252838	0.214459	0.325563	0.161059	0.169932	0.158671	0.072523	0.0809009	0.0915766	0.1355405	0.1531532	0.1979505	0.2629279	0.3092117	0.1805405
Tm	0.235147	0.191838	0.29678	0.148806	0.153803	0.146585	0.067185	0.0821766	0.0846752	0.1193781	0.1360355	0.17407	0.2420877	0.2840089	0.1599112
Yb	0.208221	0.170564	0.265654	0.137269	0.138411	0.136401	0.065768	0.0764786	0.0759763	0.1074218	0.1208952	0.1566796	0.2150263	0.2560859	0.144485
Lu	0.185042	0.155125	0.248476	0.126593	0.122161	0.124654	0.063989	0.0684211	0.067867	0.0925208	0.1060942	0.1415512	0.1980609	0.2288089	0.1263158

Chondrite normalised REE data:

	CC46	CC47	cc57	cc61	cc63	cc64	cc66	cc68	CC69	CC71	cc72	cc73a	cc73a1	cc74a	cc75a
La	33.163871	39.636452	48.649677	89.643226	79.690968	55.501935	36.836452	13.722258	41.758065	37.835161	72.518065	60.841613	73.4	64.733548	34.861613
Ce	11.989877	15.585432	16.07642	26.347778	21.124568	21.084198	12.636543	3.8237037	13.218889	12.647531	23.376914	20.865309	24.634074	22.361235	12.898889
Pr	17.971667	21.589167	22.475833	37.113333	31.218333	27.346667	17.4825	5.2766667	18.555	18.310833	34.129167	28.951667	34.656667	32.3	17.665
Nd	15.343833	18.122	18.324	31.6995	26.159333	22.484333	14.072	4.33	15.333833	15.081833	28.386833	23.551833	28.323667	26.395333	14.670667
Sm	8.464	9.93625	10.28	17.3035	14.42825	12.555	7.82125	2.1765	8.24975	8.2705	15.4675	12.6635	15.30475	14.671	8.02775
Eu	5.6042857	6.0657143	6.3814286	11.342857	9.7414286	7.74	4.8671429	1.4457143	5.1828571	5.1114286	9.6957143	7.7014286	9.15	9.0471429	5.0242857
Gd	7.3280769	8.1465385	8.8065385	16.586923	14.171154	10.794615	6.9096154	2.1238462	7.2196154	7.0703846	14.188846	11.118462	13.314231	12.436923	7.0126923
Tb	5.016	5.516	6.516	11.746	10.04	7.52	4.824	1.73	5.006	4.948	9.368	7.708	9.04	8.754	4.862
Dy	4.3559375	4.6421875	5.7826563	11.223438	9.8421875	6.718125	4.3170313	1.4432813	4.5390625	4.4370313	8.2554688	6.77375	7.985625	7.65375	4.4503125
Ho	3.7885714	4.0528571	5.5857143	11.342857	10.107143	6.2514286	4.02	1.4085714	4.2457143	4.1114286	7.68	6.3942857	7.2514286	7.1385714	4.02
Er	3.1519048	3.422619	4.9569048	10.189286	9.3797619	5.5345238	3.5478571	1.2771429	3.685	3.4490476	6.5064286	5.6180952	6.1466667	5.9319048	3.557381
Tm	2.7266667	3.1466667	4.8333333	9.9166667	8.8533333	5.1933333	3.41	1.2933333	3.4766667	3.2	5.8366667	5.2866667	5.7533333	5.6	3.4066667
Yb	1.9197619	2.3197619	3.3492857	7.295	6.3790476	3.91	2.5002381	1.0016667	2.5757143	2.2254762	4.2166667	3.872381	4.125	4.0842857	2.4461905
Lu	1.8433333	2.3266667	3.6033333	7.8033333	6.8466667	3.9833333	2.6466667	1.0766667	2.56	2.2633333	4.2733333	3.9533333	4.2766667	4.0833333	2.56

SCO-I normalised REE data:

	CC46	CC47	cc57	cc61	cc63	cc64	cc66	cc68	CC69	CC71	cc72	cc73a	cc73a1	cc74a	cc75a
La	0.3471672	0.4149236	0.5092762	0.9384063	0.8342237	0.5810072	0.3856126	0.1436478	0.4371332	0.3960673	0.7591361	0.6369042	0.7683684	0.6776459	0.3649395
Ce	0.1711898	0.2225266	0.2295368	0.3761898	0.3016136	0.3010372	0.1804228	0.0545943	0.1887374	0.1805796	0.3337722	0.2979119	0.3517218	0.3192705	0.1841685
Pr	0.3082795	0.3703328	0.3855423	0.6366287	0.535508	0.4690949	0.2998885	0.090514	0.3182858	0.3140974	0.5854394	0.4966265	0.594488	0.5540626	0.303019
Nd	0.3356852	0.3964646	0.4008839	0.6935067	0.5723016	0.4919017	0.3078606	0.0947297	0.3354664	0.3299533	0.6210338	0.5152559	0.6196519	0.5774647	0.3209579
Sm	0.3269658	0.3838391	0.3971182	0.6684372	0.5573658	0.4850018	0.3021362	0.0840786	0.3186893	0.3194909	0.5975122	0.4891932	0.5912252	0.5667433	0.3101134
Eu	0.3431896	0.3714461	0.3907795	0.6946024	0.5965357	0.4739743	0.2980492	0.0885312	0.3173826	0.3130085	0.5937363	0.4716123	0.5603184	0.5540198	0.3076721
Gd	0.4000714	0.4447547	0.480787	0.9055518	0.7736645	0.5893247	0.3772258	0.1159499	0.39415	0.3860029	0.7746304	0.6070049	0.7268814	0.6789854	0.3828532
Tb	0.3680657	0.4047549	0.4781333	0.861902	0.7367185	0.5518051	0.3539771	0.1269445	0.367332	0.363076	0.6874083	0.5656002	0.6633402	0.642354	0.3567655
Dy	0.3548399	0.3781582	0.4710622	0.9142748	0.8017565	0.5472666	0.3516706	0.1175714	0.3697575	0.3614459	0.6725005	0.5517979	0.6505187	0.6234837	0.3625278
Ho	0.3403054	0.3640447	0.5017323	1.0188631	0.907866	0.5615296	0.3610933	0.1265238	0.3813679	0.3693058	0.6898499	0.5743616	0.6513538	0.6412165	0.3610933
Er	0.2981532	0.3237613	0.4688964	0.9638514	0.8872748	0.523536	0.3356081	0.1208108	0.3485811	0.3262613	0.615473	0.5314414	0.5814414	0.5611261	0.336509
Tm	0.2270961	0.2620766	0.4025541	0.82593	0.7373681	0.4325375	0.2840089	0.1077179	0.2895614	0.2665186	0.4861188	0.4403109	0.4791782	0.4664076	0.2837313
Yb	0.1841288	0.2224937	0.3212377	0.6996803	0.6118292	0.3750171	0.2398036	0.0960722	0.2470427	0.2134506	0.4044302	0.371409	0.3956383	0.3917333	0.2346198
Lu	0.1531856	0.1933518	0.299446	0.6484765	0.5689751	0.3310249	0.2199446	0.0894737	0.2127424	0.1880886	0.3551247	0.3285319	0.3554017	0.3393352	0.2127424

Chondrite normalised REE data:

	cc76a	cc73b	cc74b	cc78	cc81	cc82	cc83	cc101	cc102	cc103	CC104	cc56	cc(56)2	CC107	CC109	CC110
La	57.718065	49.048065	48.658387	13.6	68.504194	58.309677	57.47	63.542258	46.439677	33.952258	53.291613	35.439032	41.19194	48.73968	48.51	34.72387
Ce	20.176173	19.695062	20.597037	4.1758025	29.862346	26.016173	24.490988	17.51716	15.28284	15.723333	22.012716	14.484321	16.32741	18.03395	16.435432	12.62778
Pr	28.7925	25.61	25.763333	5.565	37.274167	31.065	31.075	26.093333	21.078333	18.113333	28.046667	17.420833	20.31417	25.78583	24.355	18.25833
Nd	23.555667	21.0955	20.897667	4.5095	30.761667	25.65	25.251	21.755	17.362833	14.568	22.682167	13.888833	16.3445	21.73283	20.585667	15.42183
Sm	12.7925	12.10975	11.82175	2.4305	17.764	14.41725	14.24875	11.5345	9.452	8.1775	12.499	7.8765	9.2925	12.186	11.32425	8.58475
Eu	7.7971429	7.6514286	7.4371429	1.5485714	11.077143	8.7	8.57	7.6357143	6.1271429	5.0714286	7.6685714	4.8628571	5.755714	7.478571	7.3128571	5.344286
Gd	11.155	10.490769	9.7142308	2.1365385	14.633077	11.662308	11.589615	11.172692	8.4430769	6.4207692	10.143462	6.4334615	7.751538	10.16962	10.106154	7.425769
Tb	7.696	7.162	6.916	1.55	10.096	7.904	7.97	8.14	6.12	4.59	7.428	4.568	5.452	6.862	6.906	5.144
Dy	6.7407813	6.196875	5.760625	1.4509375	8.610625	6.9848438	6.7870313	7.6423438	5.7396875	3.945625	6.5698438	4.1109375	4.799531	5.939844	6.0060938	4.571875
Ho	6.1728571	5.5442857	5.2371429	1.38	7.6771429	6.1414286	5.9942857	7.8428571	5.6328571	3.7028571	5.9585714	3.8114286	4.415714	5.415714	5.5557143	4.222857
Er	5.2619048	4.6447619	4.3540476	1.2066667	6.4552381	5.1190476	4.9769048	6.9466667	5.0352381	3.3471429	4.9652381	3.3514286	3.719524	4.49881	4.6511905	3.455
Tm	4.9966667	4.3266667	4.2433333	1.2133333	5.78	4.71	4.6833333	6.8266667	4.7766667	3.3733333	4.9666667	3.3533333	3.63	4.17	4.06	3.15
Yb	3.5783333	3.1659524	3.3142857	0.9835714	4.2907143	3.6278571	3.5245238	4.8642857	3.4452381	2.7316667	3.6064286	2.7028571	2.81119	2.958095	2.8909524	2.237143
Lu	3.64	3.2533333	3.2733333	0.9733333	4.2766667	3.75	3.4866667	5.0833333	3.76	2.7766667	3.8133333	2.78	2.813333	3.053333	2.9766667	2.32

SCO-1 normalised REE data:

	cc76a	cc73b	cc74b	cc78	cc81	cc82	cc83	cc101	cc102	cc103	CC104	cc56	cc(56)2	CC107	CC109	CC110
La	0.6042062	0.5134466	0.5093674	0.142368	0.7171179	0.6103993	0.6016094	0.6651752	0.4861414	0.3554202	0.5578691	0.3709841	0.431207	0.510218	0.507814	0.363498
Ce	0.2880725	0.2812033	0.2940816	0.0596215	0.4263703	0.3714552	0.3496788	0.2501075	0.2182062	0.2244955	0.3142944	0.2068051	0.23312	0.257486	0.2346628	0.180298
Pr	0.4938962	0.4393047	0.4419349	0.09546	0.6393876	0.5328778	0.5330493	0.4475956	0.3615701	0.3107096	0.4811024	0.2988307	0.348462	0.442321	0.4177769	0.313197
Nd	0.5153398	0.4615174	0.4571893	0.0986567	0.6729893	0.5611586	0.5524295	0.4759457	0.3798559	0.3187119	0.4962298	0.3038534	0.357577	0.475461	0.4503635	0.337392
Sm	0.4941765	0.4678017	0.4566763	0.0938906	0.6862264	0.5569409	0.5504317	0.4455797	0.3651324	0.3158982	0.4828385	0.3042706	0.358971	0.470747	0.4374577	0.33163
Eu	0.4774735	0.4685504	0.4554282	0.0948298	0.6783309	0.5327618	0.524801	0.4675881	0.3752078	0.310559	0.4696002	0.2977867	0.352463	0.457965	0.4478173	0.327268
Gd	0.6089997	0.5727364	0.5303418	0.1166429	0.7988829	0.6366958	0.6327272	0.6099656	0.4609441	0.3505375	0.5537754	0.3512305	0.42319	0.555203	0.5517386	0.405405
Tb	0.5647197	0.5255357	0.5074846	0.1137364	0.7408277	0.5799824	0.5848254	0.5972997	0.4490754	0.3368066	0.5450543	0.3351923	0.400059	0.503522	0.5067508	0.377458
Dy	0.5491122	0.5048049	0.4692675	0.1181951	0.7014319	0.5689938	0.5528798	0.6225546	0.4675619	0.3214154	0.5351874	0.3348819	0.390976	0.483867	0.4892637	0.37243
Ho	0.554472	0.498011	0.4704222	0.1239574	0.6895932	0.5516489	0.5384319	0.7044784	0.5059669	0.3326062	0.5352239	0.3423585	0.396638	0.486462	0.4990376	0.379315
Er	0.4977477	0.4393694	0.4118694	0.1141441	0.6106306	0.4842342	0.4707883	0.6571171	0.4763063	0.3166216	0.4696847	0.317027	0.351847	0.425563	0.4399775	0.326824
Tm	0.4161577	0.3603554	0.3534148	0.101055	0.4813992	0.3922821	0.3900611	0.568573	0.3978345	0.280955	0.4136591	0.2792893	0.302332	0.347307	0.3381455	0.262354
Yb	0.3432062	0.3036538	0.3178808	0.0943366	0.4115323	0.3479562	0.3380452	0.4665449	0.3304407	0.2620005	0.3459009	0.2592373	0.269628	0.283718	0.2772779	0.21457
Lu	0.3024931	0.2703601	0.2720222	0.0808864	0.3554017	0.3116343	0.2897507	0.4224377	0.3124654	0.2307479	0.3168975	0.2310249	0.233795	0.25374	0.2473684	0.192798

	h8	H43(2)	H43(4)	H43(5)	H39	H38	CC104	CC107	CC110	CC109	H52	H53	H64	H65	H66	CC46	CC47
La	9.0164	6.4995	6.7145	6.4456	10.5023	8.5281	16.5204	15.1093	10.7644	15.0381	2.3169	2.7142	2.8561	4.5418	5.4999	10.2808	12.2873
Sm	1.1748	0.76245	0.7661	0.7573	1.6984	1.09655	2.4998	2.4372	1.71695	2.26485	0.21805	0.261	0.2993	0.54365	0.6856	1.6928	1.98725
La/Sm	7.674838	8.524493	8.764522	8.51129	6.183643	7.77721	6.608689	6.1994502	6.2694895	6.6397775	10.625545	10.399234	9.5425994	8.3542721	8.0220245	6.0732514	6.1830671
Eu/Eu*	0.722585	0.68101	0.673112	0.716335	0.514179	0.715725	0.681057	0.6717935	0.6693529	0.6835801	0.6839138	0.690062	0.6798602	0.6634791	0.6969772	0.7116024	0.6741928

	CC69	CC71	cc56	cc103	cc57	cc102	cc101	cc61	cc63	cc64	cc66	cc68	cc72	cc73a	cc76a	cc74a
La	12.945	11.7289	10.9861	10.5252	15.0814	14.3963	19.6981	27.7894	24.7042	17.2056	11.4193	4.2539	22.4806	18.8609	17.8926	20.0674
Sm	1.64995	1.6541	1.5753	1.6355	2.056	1.8904	2.3069	3.4607	2.88565	2.511	1.56425	0.4353	3.0935	2.5327	2.5585	2.9342
La/Sm	7.8456923	7.0908047	6.9739732	6.4354632	7.3353113	7.6154782	8.538775	8.0299939	8.5610521	6.8520908	7.3001758	9.7723409	7.2670438	7.4469538	6.9933946	6.8391384
Eu/Eu*	0.6715708	0.6684284	0.6831287	0.6998847	0.6706852	0.6858763	0.6726225	0.6695339	0.6812605	0.6648582	0.6620779	0.6724215	0.6544797	0.6490409	0.6527141	0.6697691

	cc75a	cc73b	cc74b	cc78	cc81	cc82	cc83	h69	h75	h85	h82	cc(56)2	cc73a1
La	10.8071	15.2049	15.0841	4.216	21.2363	18.076	17.8157	7.4436	9.7691	7.0283	10.3633	12.7695	22.754
Sm	1.60555	2.42195	2.36435	0.4861	3.5528	2.88345	2.84975	0.8984	1.29095	0.8126	1.56165	1.8585	3.06095
La/Sm	6.731089	6.2779578	6.3798084	8.6731125	5.9773418	6.2688793	6.2516712	8.2853963	7.5673729	8.6491509	6.6361221	6.8708636	7.4336399
Eu/Eu*	0.6696302	0.678846	0.6940025	0.6795604	0.6870519	0.6709433	0.6668957	0.6635183	0.7003129	0.6279365	0.4867705	0.6781706	0.6409881

	h8	H43(2)	H43(4)	H43(5)	H39	H38	CC104	CC107	CC110	CC109	H52	H53	H64	H65	H66	CC46	CC47
Gd/Yb	2.776705	2.751622	2.908761	2.727273	3.162899	2.960236	3.482274	4.2564392	4.1096211	4.3281173	1.9090278	2.0238877	2.1574992	2.5897109	2.8734416	4.7260325	4.3479421
Eu/Eu*	0.722585	0.68101	0.673112	0.716335	0.514179	0.715725	0.681057	0.6717935	0.6693529	0.6835801	0.6839138	0.690062	0.6798602	0.6634791	0.6969772	0.7116024	0.6741928

	CC69	CC71	cc56	cc103	cc57	cc102	cc101	cc61	cc63	cc64	cc66	cc68	cc72	cc73a	cc76a	cc74a
Gd/Yb	3.4703272	3.9334546	2.9469697	2.9101368	3.2554205	3.0341396	2.8437592	2.8151049	2.7504479	3.4180977	3.4215789	2.6251486	4.1661208	3.5548451	3.8596048	3.7700828
Eu/Eu*	0.6715708	0.6684284	0.6831287	0.6998847	0.6706852	0.6858763	0.6726225	0.6695339	0.6812605	0.6648582	0.6620779	0.6724215	0.6544797	0.6490409	0.6527141	0.6697691

	cc75a	cc73b	cc74b	cc78	cc81	cc82	cc83	h69	h75	h85	h82	cc(56)2	cc73a1
Gd/Yb	3.5493479	4.1025795	3.6288793	2.6894214	4.2224072	3.9800486	4.0712018	2.9648739	2.8897621	2.8193457	2.9070804	3.413907	3.9961905
Eu/Eu*	0.6696302	0.678846	0.6940025	0.6795604	0.6870519	0.6709433	0.6668957	0.6635183	0.7003129	0.6279365	0.4867705	0.6781706	0.6409881

	h8	H43(2)	H43(4)	H43(5)	H39	H38	CC104	CC107	9 CC110	CC109	H52	H53	H64	H65	H66	CC46	CC47
Sr	429.5193	571.5926	558.2338	551.4779	506.1702	605.4357	573.2463	353.9271	397.9853	374.7712	346.8303	382.1944	341.5819	387.1824	416.5383	410.0567	370.9391
Tl/Zr	0.003807	0.005204	0.004624	0.004445	0.00119	0.004043	0.004989	0.0059377	0.0060158	0.0058648	0.0052941	0.0036401	0.0051334	0.0049604	0.0059101	0.004071	0.0068085

	CC69	CC71	cc56	cc103	cc57	cc102	cc101	cc61	cc63	cc64	cc66	cc68	cc72	cc73a	cc76a	cc74a
Sr	400.571	394.1058	552.8061	558.2099	569.9631	650.1629	707.3356	764.8093	800.1281	608.3634	671.2743	582.6068	645.7801	644.2496	659.7844	673.0979
Tl/Zr	0.0059981	0.0059637	0.0069173	0.0067397	0.0057695	0.0052411	0.0044018	0.0033699	0.0034994	0.0054288	0.0065453	0.0047524	0.0046729	0.0056836	0.0059921	0.0063758

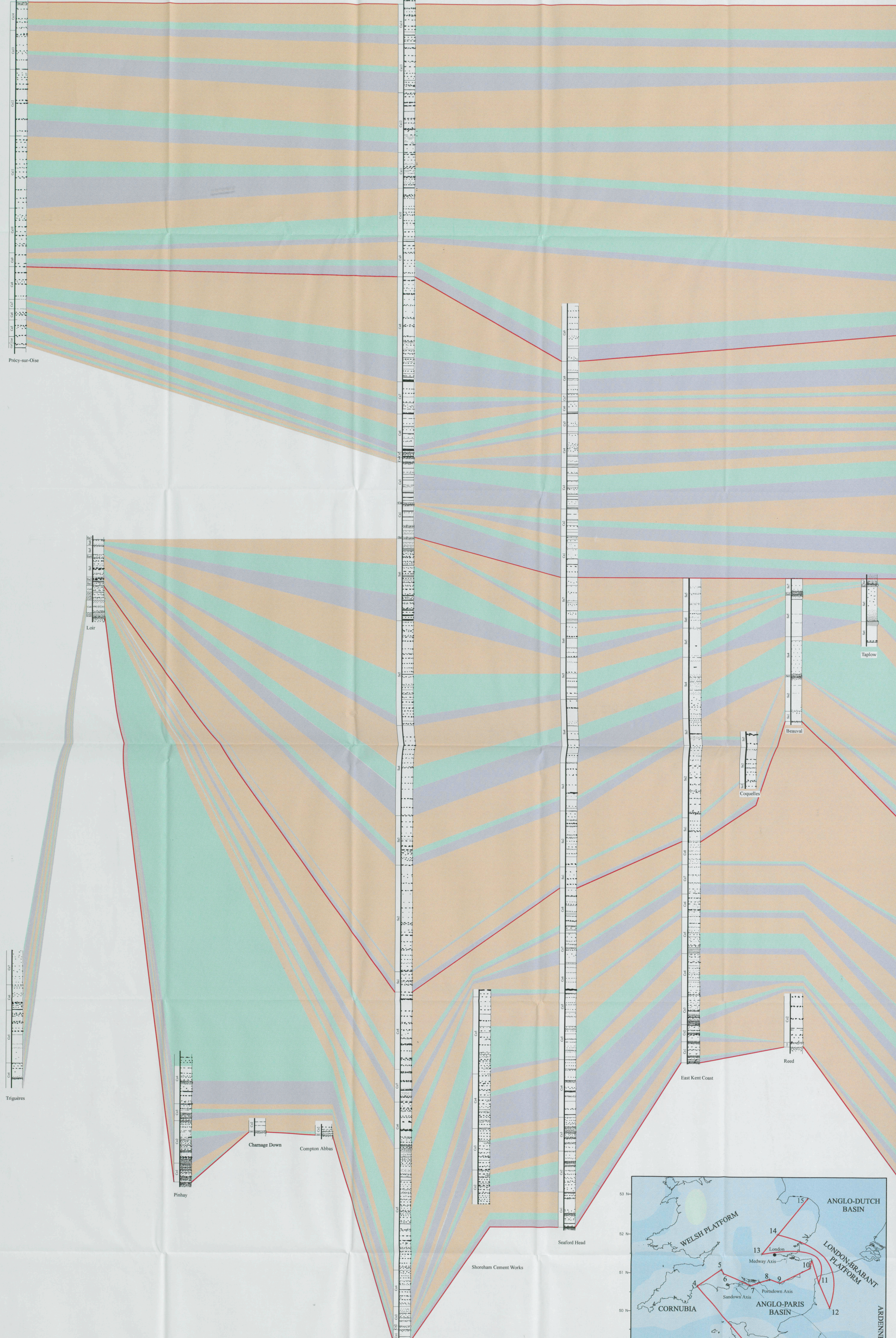
	cc75a	cc73b	cc74b	cc78	cc81	cc82	cc83	h69	h75	h85	h82	cc(56)2	cc73a1
Sr	612.2145	629.8603	628.412	701.3342	571.9728	621.0001	588.5789	699.6873	602.8785	592.8103	597.1546	644.9759	613.3561
Tl/Zr	0.005854	0.0061837	0.0064692	0.0056783	0.0064439	0.0066853	0.006633	0.005467	0.0056758	0.0050261	0.0015097	0.0045469	0.0059006

	h8	H43(2)	H43(4)	H43(5)	H39	H38	CC104	CC107	CC110	CC109	H52	H53	H64	H65	H66	CC46	CC47
Ti	0.0448	0.0114	0.0104	0.0099	0.0291	0.021	0.0924	0.1	0.0729	0.0717	0.0036	0.0032	0.0051	0.0132	0.0287	0.0305	0.0847
Zr	11.7676	2.1906	2.2492	2.2272	24.4601	5.1939	18.5214	16.8415	12.1181	12.2255	0.68	0.8791	0.9935	2.6611	4.8561	7.4921	12.4404
Th	0.891	0.2656	0.2646	0.2453	2.1863	0.7341	2.369	2.2798	1.2983	1.3719	0.0464	0.0644	0.1138	0.3158	0.638	0.6756	1.7572
Tl/Zr	0.003807	0.005204	0.004624	0.004445	0.00119	0.004043	0.004989	0.0059377	0.0060158	0.0058648	0.0052941	0.0036401	0.0051334	0.0049604	0.0059101	0.004071	0.0068085

	CC69	CC71	cc56	cc103	cc57	cc102	cc101	cc61	cc63	cc64	cc66	cc68	cc72	cc73a	cc76a	cc74a
Ti	0.0619	0.0756	0.0879	0.1303	0.086	0.0728	0.0505	0.0528	0.0383	0.1003	0.0683	0.0109	0.1006	0.099	0.1011	0.1045
Zr	10.3199	12.6766	12.7072	19.3333	14.906	13.8903	11.4727	15.668	10.9446	18.4754	10.435	2.2936	21.5283	17.4186	16.8721	16.3901
Th	1.1418	1.5511	1.8059	2.6149	1.7084	1.4669	1.0135	1.2254	0.6544	2.3108	1.243	0.2465	2.1936	2.0661	2.1632	2.2527
Tl/Zr	0.0059981	0.0059637	0.0069173	0.0067397	0.0057695	0.0052411	0.0044018	0.0033699	0.0034994	0.0054288	0.0065453	0.0047524	0.0046729	0.0056836	0.0059921	0.0063758

	cc75a	cc73b	cc74b	cc78	cc81	cc82	cc83	h69	h75	h85	h82	cc(56)2	cc73a1
Ti	0.076	0.0981	0.1224	0.0145	0.1959	0.1703	0.1531	0.0292	0.0641	0.0209	0.0471	0.0676	0.0932
Zr	12.9826	15.8644	18.9204	2.5536	30.4009	25.4738	23.0817	5.3411	11.2936	4.1583	31.1974	14.8673	15.795
Th	1.5233	2.221	2.615	0.3438	4.0909	3.7499	3.3839	0.7339	1.4733	0.56	2.4496	1.6332	2.056
Tl/Zr	0.005854	0.0061837	0.0064692	0.0056783	0.0064439	0.0066853	0.006633	0.005467	0.0056758	0.0050261	0.0015097	0.0045469	0.0059006

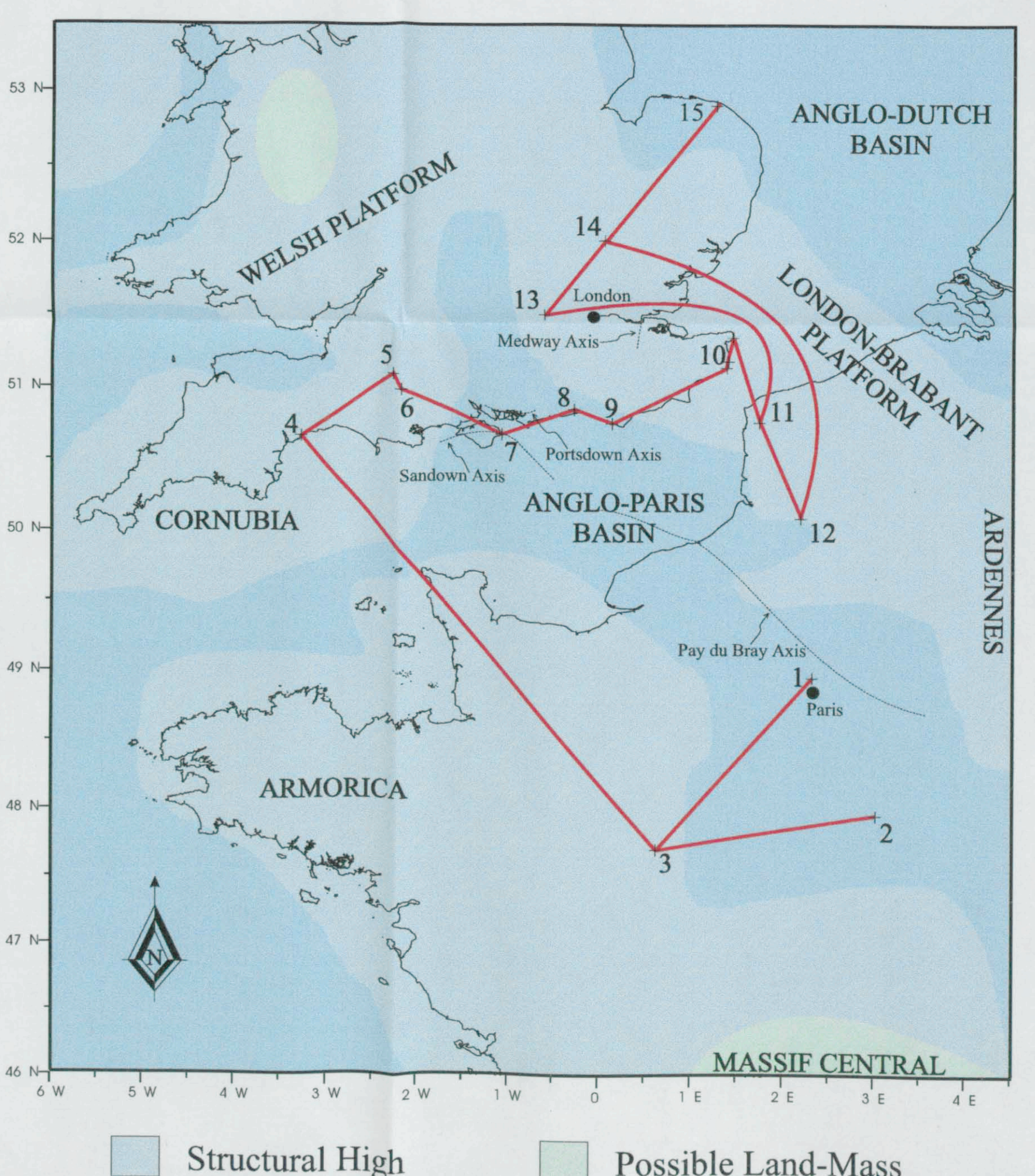


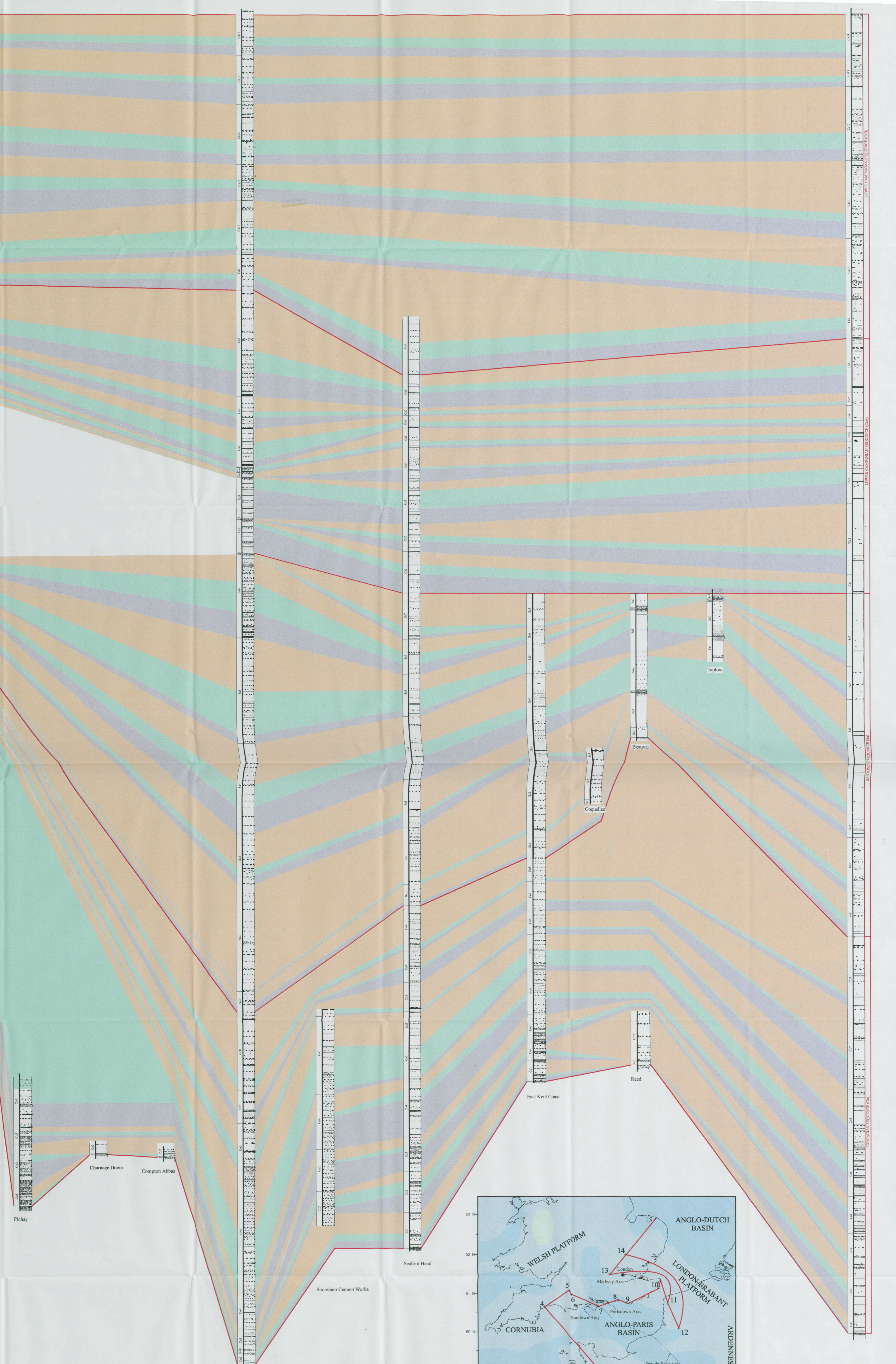


Appendix D

Sequence stratigraphical cross-section

1: Précy-sur-Oise, Paris (00.30gr 54.56gr) Mortimore and Pomerol, 1987. 2: Les Grands Moreaux Quarry, Triguères (31°0E 47°55'20N) Mortimore and Pomerol, 1987. 3: Sections around Villedieu-le-Château, Loir Valley (x473.26 y303.49) Jarvis, Gale and Clayton, 1982. 4: Pinhay Cliff, Devon (SY 3150 9075) Jarvis and Tooley, 1987. 5: Charnage Down Quarry, Mere (ST 386328) Bromley and Gale, 1982. 6: Compton Abbas Downs, Shaftesbury (SY 8842 1885) Bromley and Gale, 1982. 7: Culver Cliff, Isle of Wight (SZ 638854) Mortimore, 1986. 8: Shoreham Cement Works Quarry, Sussex (TQ 2000 0865) Lake, Mortimore and Wood, 1987. 9: Seaford Head, Sussex (TV 4995 9750) Mortimore, 1986. 10: Langdon Stairs to Kingsdown, East Kent Coast (TR 3451 4250) to (TR 3800 4775) Robinson, 1986. 11: Coquelles Quarry, Calais (0.624gr 56.59gr), Robaszyński and Amedro 1986b. 12: Beuval Quarry, Somme (x599.89 y266.80), Jarvis 1980a. 13: Taplow Quarry, Buckinghamshire (SU 066019), Jarvis, 1980a. 14: Reed (TL 3555 3705) Bromley and Gale, 1982. 15: Trunch Borehole, Norfolk (TG 2933 3455) Gallois and Morter, 1975.

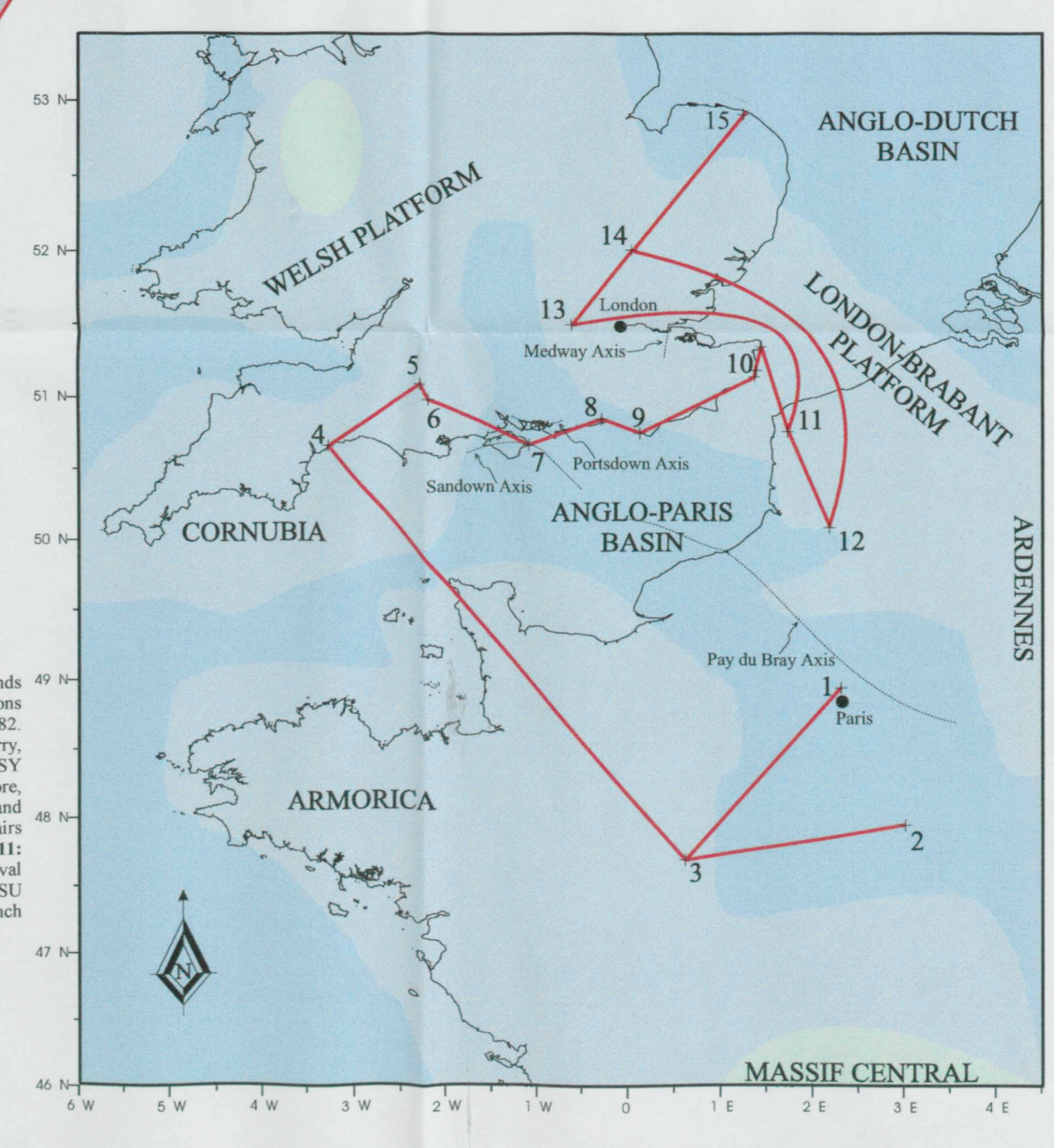




ix D

Stratigraphical cross-section

1. Pr cy-sur-Oise, Paris (00.30gr 54.56gr) Mortimore and Pomeroi, 1987.
2. Les Grands Moreaux Quarry, Trignolles (01°0E-47°55'20N) Mortimore and Pomeroi, 1987.
3. Sections around Villiers-le-Ch teau, Loir Valley (s473.26 v303.49) Jarvis, Gale and Clayton, 1982.
4. Pinhay Cliff, Devon (SY 3150 9075) Jarvis and Tocher, 1987.
5. Charnage Down Quarry, Mere (ST 386328) Bromley and Gale, 1982.
6. Compton Abbas Down, Shaftesbury (SY 8842 1885) Bromley and Gale, 1982.
7. Culver Cliff, Isle of Wight (SZ 638854) Mortimore, 1986.
8. Shoreham Cement Works Quarry, Sussex (TQ 2000 0865) Lake, Mortimore and Wood, 1987.
9. Seaford Head, Sussex (TV 4995 9750) Mortimore, 1986.
10. Langdon Stairs to Kingsdown, East Kent Coast (TR 3451 4250) to (TR 3800 4775) Robinson, 1986.
11. Coquelles Quarry, Calais (0 624g 56 59gr) Robaszynski and Amedeo 1986b.
12. Beuval Quarry, Somme (s599.89 v266.80) Jarvis 1980a.
13. Taplow Quarry, Buckinghamshire (SU 906819) Jarvis, 1980a.
14. Reed (TL 3595 3705) Bromley and Gale, 1982.
15. Trunch Borehole, Norfolk (TG 2933 3455) Gallois and Morter, 1975.



Structural High Possible Land-Mass