

LUNDS UNIVERSITETS ÅRSSKRIFT. N. F. Avd. 2. Bd 59. Nr 1.

KUNGL. FYSIOGRAFISKA SÄLLSKAPETS HANDLINGAR, N. F. Bd 74. Nr 1.

A REVISION OF
THE CLASSIFICATION OF THE PLESIOSAURIA
WITH A SYNOPSIS OF THE STRATIGRAPHICAL
AND GEOGRAPHICAL DISTRIBUTION
OF THE GROUP

BY

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Read before the Royal Physiographic Society, February 13, 1963.

LUND

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1963

1. Introduction

The sub-order Plesiosauria is one of the best known of the Mesozoic Reptile groups, but, as emphasized by KUHN (1961, p. 75) and other authors, its classification is still not satisfactory, and needs a thorough revision. The present paper is an attempt at such a revision, and includes also a tabular synopsis of the stratigraphical and geographical distribution of the group. Some of the species are discussed in the text (pp. 17—22). The synopsis is completed with seven maps (figs. 2—8, pp. 10—16), a selective synonym list (pp. 41—42), and a list of rejected species (pp. 42—43). Some forms which have been erroneously referred to the Plesiosauria are also briefly mentioned ("Non-Plesiosaurians", p. 43). — The numerals in brackets after the generic and specific names in the text refer to the tabular synopsis, in which the different forms are numbered in successional order.

The author has examined all material available from Sweden, Australia and Spitzbergen (PERSSON 1954, 1959, 1960, 1962, 1962a); the major part of the material from the British Isles, France, Belgium and Luxembourg; some of the German specimens; certain specimens from New Zealand, now in the British Museum (see LYDEKKER 1889, pp. 188; 215—217; 220—221); and casts of some of the South American specimens.¹ For the rest, the revision and the synopsis are based upon information gathered from the literature.

2. Discussion of the classification

WELLES (1943, pp. 196—198) gave a brief review of the classifications proposed by previous authors, from OWEN (1840) to WHITE (1940). He also listed and discussed the characters available for observation (*ibid.*, pp. 197—201), and suggested a new classification (*ibid.*, p. 212; quoted below).

Suborder PLESIOSAURIA

Superfamily **Pliosauroidae** (=Brachydeira; short neck, long head, long ischia, pendulous propodials)

Family Pliosauridae (dicranopleurous, long epipodials, Jurassic)

¹ Travelling scholarships generously awarded by the Royal Physiographic Society, Lund, have enabled me to visit the principal paleontological museums in Australia, Belgium, England and France, and the Directors of the museums have kindly permitted me to examine the Plesiosaurian material in their keeping.

Family Polycotylidae (cercidopleurous, short epipodials, Cretaceous)

Superfamily **Plesiosauroidea** (=Dolichodeira; long neck, short head, short ischia, stocky propodials)

Family Plesiosauridae (dicranopleurous, long epipodials, Jurassic)

Family Elasmosauridae (cercidopleurous, short epipodials, Upper Jurassic and Cretaceous)

This classification, being based upon several different characters, is certainly more appropriate than any of the older ones, and has been adopted by most recent authors, among others ROMER in earlier works (1953 etc.) and SAINT-SEINE in PIVETEAU (1955). However, in its original formulation it has certain disadvantages. Hence, too much importance is attached to the shape of the cervical rib heads and of the epipodial bones, characters in these elements being regarded as the essential factors distinguishing the Pliosauridae from the Polycotylidae, and the Plesiosauridae from the Elasmosauridae. A consequence of this valuation of the characters mentioned is, that on strict application of WELLE's classification certain genera should be placed within the Polycotylidae or the Elasmosauridae, although most of their known features are typically Pliosauridean or Plesiosauridean. Examples of such genera are *Kronosaurus* [311] (Pliosauridae), *Cryptocleidus* [23, 24, 25, ?97, 203, ?204], *Muraenosaurus* [20, 26, 27, 99, 100, ?102, 197, 198, 199, 200, 201, 202, ?272], *Picrocleidus* [28] and *Tricleidus* [31, 228, ?274] (Plesiosauridae). These forms are cercidopleurous and have short epipodial bones. In consequence, *Kronosaurus* should belong to the Polycotylidae and the other genera mentioned to the Elasmosauridae. However, with regard to the characters in the skull, vertebral column, girdle bones etc. *Kronosaurus* is a Pliosaurid, and the other forms are Plesiosaurids. As a matter of fact, WELLES himself did not follow his scheme strictly, but grouped *Kronosaurus* with the Pliosauridae and the other genera with the Plesiosauridae (WELLES 1943, p. 203, fig. 37).

ROMER (1956, pp. 665—668) followed WELLES on essential points, but included the Pistosauroidea in the sub-order (see below, p. 7). To the original scheme he also added the families Rhomaleosauridae (Thaumatosauridae¹) and Leptocleididae (the latter name was originally introduced by WHITE, 1940, p. 465). According to ROMER the Rhomaleosauridae belong to the Plesiosauroidea and the Leptocleididae to the Pliosauroidae. As will be demonstrated below (pp. 7—8 and 19) the Leptocleididae probably should be included in the Rhomaleosauridae, and the correct place for the latter family is certainly the Pliosauroidae, not the Plesiosauroidea.

KUHN (1961, pp. 75—77) adopted, with some modifications, the classification given by WHITE (1940, pp. 459—466). This is essentially based upon two complexes of characters, viz. 1.) the length — breadth relations of the skull, and 2.) details in the pectoral girdle (presence or absence of the interclavicle and of the pectoral bar, etc.;

¹ ROMER used the name Thaumatosauridae for the family in question. However, since the genotype of *Thaumatosaurus* [144] cannot be defined (TARLO 1960, p. 178), the family name mentioned was replaced by KUHN (1961, p. 76) with Rhomaleosauridae. The latter name is used in the present paper.

see WHITE 1940, p. 460). However, WELLES (1943, pp. 197—198) and other authors have demonstrated that most of the characters used by WHITE are of questionable value, some of them being more or less dependent upon the state of preservation and others upon the ontogenetic stages.

During the last decades new material of certain mesodiran¹ forms has been investigated, and previously described specimens of such forms have been reviewed (CABRERA 1941, pp. 113—130; PERSSON 1959, pp. 447—459; 1960, pp. 6—11; 1962, pp. 144—145). By these studies the existence of a group of mesodiran genera within the Plesiosauroidea has been proved, and the group in question was defined by the present writer as the family Cimoliasauridae (PERSSON 1960, pp. 6—7). Unfortunately I was at that time unaware of the fact that DELAIR had introduced the Cimoliasauridae already in 1959, though as a provisional family without an accurate diagnosis. DELAIR (1959, pp. 59—60) wrote as follows: "This family is very provisional and embraces many inadequately known forms of problematic affinities. Due to this it is very probable that the term Cimoliosauridae² should be employed in a much more restricted sense than at present. However, it is convenient to have a family term under which to group poorly known species, and Plesiosaurian species defying accurate classification are relatively numerous in the late Jurassic vertebrate faunas, hence the retention in its present scope of the term Cimoliosauridae to receive them.

The family genus is *Cimoliosaurus*, a form described from American material by LEIDY in 1851".

The type species of *Cimoliosaurus*, *C. magnus* LEIDY 1851 [280], is based upon adequate material (WELLES 1952, p. 108), and a number of related forms are described. The definition of the Cimoliasauridae given by the present writer (PERSSON 1960, pp. 6—7, and below, p. 7) may hence be well justified; and certainly a clearly defined taxonomic unit is more useful than a "catch-all" group.

At the present stage of our knowledge of the Plesiosaurians the following classification may be most adequate:

Super-family **Pistosauroidae** *Auct.*, ROMER 1956.

The same diagnosis as for the family Pistosauridae (see below).

Family Pistosauridae BAUR in ZITTEL 1889.

Pre-orbital part of the skull long and slender. Vestigial nasals present. Long temporal region. Premaxillae not extending between the nasals. Parietal foramen more

¹ In the present paper the term mesodiran is used for forms in which the neck is relatively longer than in typical Pliosaurids or Polycotylids, but shorter than what is generally the case in the Plesiosaurids or the Elasmosaurids. In a typical mesodiran the length of the neck is about twice the length of the head.

² Like LYDEKKER and several other authors DELAIR used the transcription *Cimoliosaurus* in the name of the type genus, and in consequence he spelled the family name Cimoliosauridae. However, LEIDY wrote *Cimoliasaurus* in his original description of the genus mentioned (see LEIDY 1851). The correct original spelling should be used.

posteriorly placed than in typical Plesiosaurians. Squamosals not in contact behind temporal fenestra.

The only known representative of this family is *Pistosaurus*. — Middle Triassic.

Super-family **Pliosauroida** WELLES 1943.

Brachydiran or mesodiran forms with large heads. Pre-orbital part of the skull more or less elongate. Long mandibular symphysis. Tooth crowns large and stout, with sharp apico-basal ridges. The end faces of the vertebral centra usually strongly concave. Cervical centra short and high. Cretaceous forms cercidopleurous, older forms dicranopleurous. Pubes and ischia elongate. Femur larger than humerus. Epipodial bones longer than broad (?Triassic and Jurassic forms), or broader than long (Cretaceous forms).

Family Rhomaleosauridae KUHN 1961 (Brancasauridae¹ WHITE 1940; Thaumatosauridae *Auct.*, ROMER 1956 *partim*)

Mesodiran forms. Pre-orbital part of the skull slightly elongate, with a more or less distinct constriction at the maxillo-premaxillary suture. 20—27 cervical vertebrae. — Upper Triassic — ?Upper Cretaceous.

Family Pliosauridae SEELEY 1874 *emend.* TARLO 1960.

Brachydiran forms. Skull large, pre-orbital part strongly elongate. Irregular dentition with large caniniform teeth. ?12—22 cervical vertebrae. Most forms dicranopleurous, and with long epipodial bones. — Upper Jurassic — Lower Cretaceous.

Family Polycotylidae WILLISTON 1908.

Pliosauroidans of the same type as the Pliosauridae, but more specialized. Skull very long and slender, neck not longer than skull. Number of cervical vertebrae 11—26. Cercidopleurous. An interclavicular foramen present. Postero-lateral part of the coracoids elongate. Epipodial bones broader than long. Accessory epipodials present. — Cretaceous.

Super-family **Plesiosauroida** WELLES 1943.

Dolichodiran or mesodiran forms with small heads. Pre-orbital part of the skull not elongate. No distinct constriction at the maxillo-premaxillary suture. Short mandibular symphysis. Tooth crowns high and slender, with fine apico-basal ridges.

¹ WHITE (1940, p. 461) included *Rhomaleosaurus* SEELEY 1874 [?46, 59, 60, 62, ?65, ?112, ?113, 154] (*Thaumatosaurus* H. v. MEYER 1841; see footnote 1, p. 4) in the Brancasauridae. The other two genera which WHITE referred to the family mentioned are *Brancasaurus* WEGNER 1914 [85] and *Seeleyosaurus* WHITE 1940 (the latter is probably a synonym of *Plesiosaurus guilelmi imperatoris* DAMES 1895 [147]; see below, p. 21). These are both definitely of Plesiosauroidan type, and are here grouped within the Plesiosauridae.

Triassic and Lower Jurassic forms dicranopleurous, younger forms cercidopleurous. Pubes and ischia short. Humerus as large as femur, or larger. Epipodial bones longer than broad (Triassic and Lower Jurassic forms), or broader than long (most of the younger forms).

Family Plesiosauridae GRAY 1825.

Dolichodiran forms. Number of cervical vertebrae 26—44. Cervical centra usually not longer than high. Coracoids not separated posteriorly. — Upper Triassic — Lower Cretaceous.

Family Cimoliasauridae DELAIR 1959 *emend.* PERSSON 1960.

Mesodiran forms. Head comparatively large.¹ The height of the cervical centra approximately equal to the length, but the breadth of these centra considerably greater than the length. The end faces of the centra almost flat. Cercidopleurous. Pubes sub-rounded. Propodial bones short and stout. — Cretaceous.

Family Elasmosauridae COPE 1869.

Extremely long-necked forms. Number of cervical vertebrae (47²) 57—76. At least the anterior and middle cervical centra much longer than high. A sharp lateral longitudinal ridge present on the anterior cervical centra. Cercidopleurous. Anterior cervical ribs "hatchet-shaped", fused with the centra. Clavicular arch large and fused. Scapulae with large flat ventral plates. Coracoids separated posteriorly. Pubes expanded into sub-rounded plates. Propodial bones short and stout. Epipodial bones broader than long. — Cretaceous.

The distribution of the genera upon the different families should be clear from the tabular synopsis (pp. 23—40). The assumed phylogenetic relations within the sub-order are shown in fig. 1 (p. 9).

Following ROMER (1956, p. 665) and KUHN (1961, p. 75) I have here included *Pistosaurus* [?124, ?125, 158, 159] in the Plesiosauria. The relationship between *Pistosaurus* and the typical Plesiosaurians is discussed by T. EDINGER (1935, pp. 321—359) and WELLES (1943, pp. 203—206); see also v. HUENE (1956, pp. 392—394).

The two main evolutionary lines in the Plesiosauria, taxonomically termed the Pliosauroidae and the Plesiosauroidae respectively (see fig. 1), must have diverged even before the beginning of the known history of the group. The oldest known Pliosauroidae all belong to the Rhomaleosauridae. Although some of these forms are fairly long-necked their general Pliosauroidae features (relatively large head, strong teeth, more or less oblongate pubes and ischia, etc.) are clearly shown, separating them definitely from the contemporaneous Plesiosauroidae, then re-

¹ See below, p. 17, *Aristonectes parvidens*.

² In *Morenosaurus* [288]; the number is an estimation (see WELLES 1952, p. 100).

presented by the Plesiosauridae only. The Rhomaleosauridae were a rather far-ranging family; if "*Cimoliasaurus*" *andium* DEECKE 1895 [296] or "*Plesiosaurus*" *balticus* SCHRÖDER 1885 [171, ?186] (see below, pp. 18 and 20) should prove definitely to be Rhomaleosaurids the family mentioned persisted almost until the end of the Plesiosaurian history.

The earliest known representatives of the Pliosauridae appeared in the U. Jurassic. Their ancestors may have been large-headed Rhomaleosaurids, possibly forms like *Rhomaleosaurus* [?46, 59, 60, 62, ?65, ?112, ?113, 154] or *Macroplata* [64, 70]. In this relatively short-lived family there was a tendency of gigantism, culminating in such forms as *Pliosaurus* [33, 34, 39, 40, ?44, ?45, 105, 206, 207, 208, 214] and *Kronosaurus* [311].

TARLO (1960) revised and discussed profoundly the U. Jurassic Pliosaurids. Where these forms are concerned the tabular synopsis (below, pp. 23—40) is essentially based upon TARLO's excellent work.

The Polycotylidae form the top of the Pliosauroidan evolutionary line. The group embraces highly specialized forms, and though it has many of its general characteristics in common with the Pliosauridae, its rank of family seems to be well justified. — The Polycotylidae are known from the Cretaceous only.

WILLISTON (1925, p. 251) placed the relatively short-headed and extremely shortnecked *Brachauchenius* [253] in a family of its own, the Brachaucheniidae. Until more is known about the genus mentioned it seems more appropriate to include it in the Polycotylidae.

The Plesiosauridae is a somewhat heterogeneous family, including forms as different from each other as for example the comparatively generalized *Plesiosaurus dolichodeirus* CONYBEARE 1824 [55, ?118, 149, ?150] and the specialized *Cryptocleidus oxoniensis* (PHILLIPS 1871) [24]. However, since the general family characters are present in all the sufficiently known genera, there is no reason to divide the family into smaller units.

The Plesiosauridae reached the Lower Cretaceous with a few forms, most of which are poorly known (see the tabular synopsis, [5, 6, 85, 86, 87, 88, 89, 137, 138, 226]).

The families Cimoliasauridae (see above, p. 5) and Elasmosauridae seem to have evolved from Plesiosauridean ancestors in late Jurassic or early Cretaceous times. Judging from details in the shape of their premaxillaries, teeth, vertebrae, pubes and propodial bones, the two families mentioned are closely related to each other (CABRERA 1941, pp. 114—129; PERSSON 1959, pp. 448—458; 1960, pp. 6—11; 1962, pp. 144—145). However, they have followed divergent lines of evolution, the Cimoliasauridae being mesodiran and the Elasmosauridae extremely dolichodiran.

The earliest known representatives of the two families are of L. Cretaceous age. In the U. Cretaceous the families in question probably were the only surviving Plesiosauroidans.

The American Elasmosaurids were revised by WELLES (1943 and 1952); in his work of 1952 WELLES also gave a valuable bibliography of the Elasmosauridae, and of the Plesiosaurians in general.

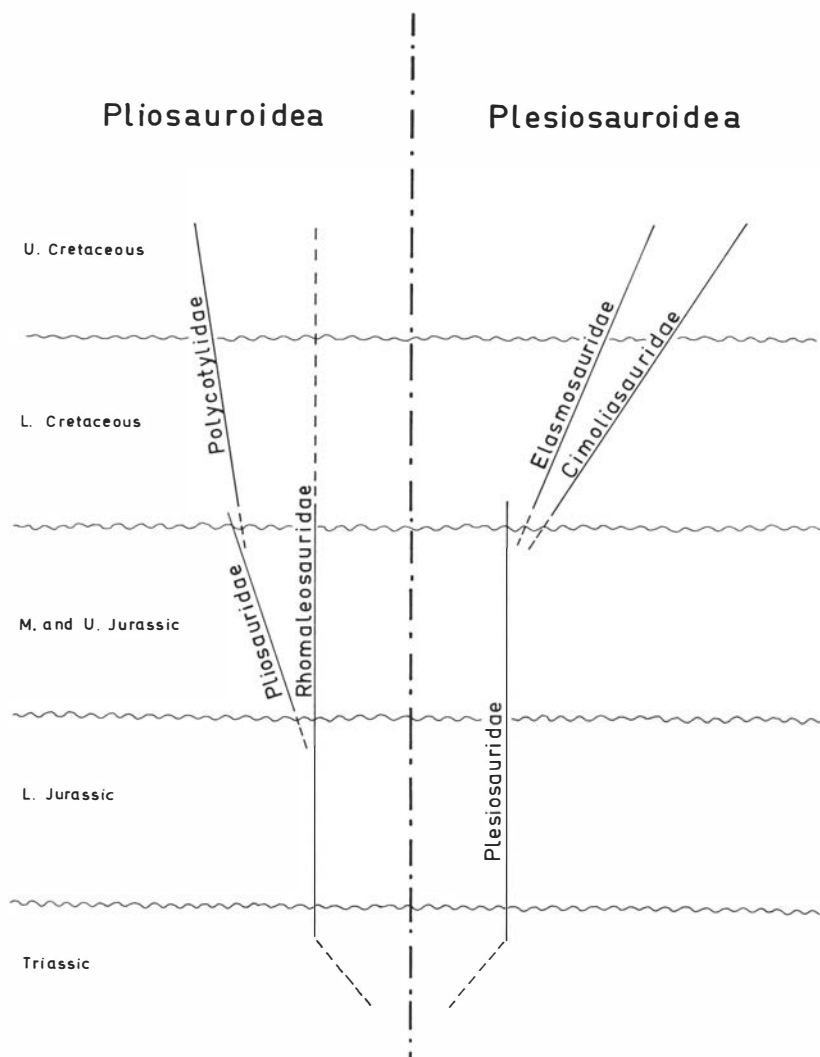


Fig. 1. The assumed phylogenetic relationship within the sub-order Plesiosauria. (The Plesiosauroidae are not here taken into consideration).

The maps, figs. 2—8 (pp. 10—16) show the geographical and stratigraphical distribution of the known finds of Plesiosaurian remains. As may be readily gathered from the maps, each of the families had a period of global, or nearly global extension. Finds of Maestrichtian age are comparatively rare (see fig. 8, p. 16), and at the end of that period the Plesiosaurians were probably entirely extinct.

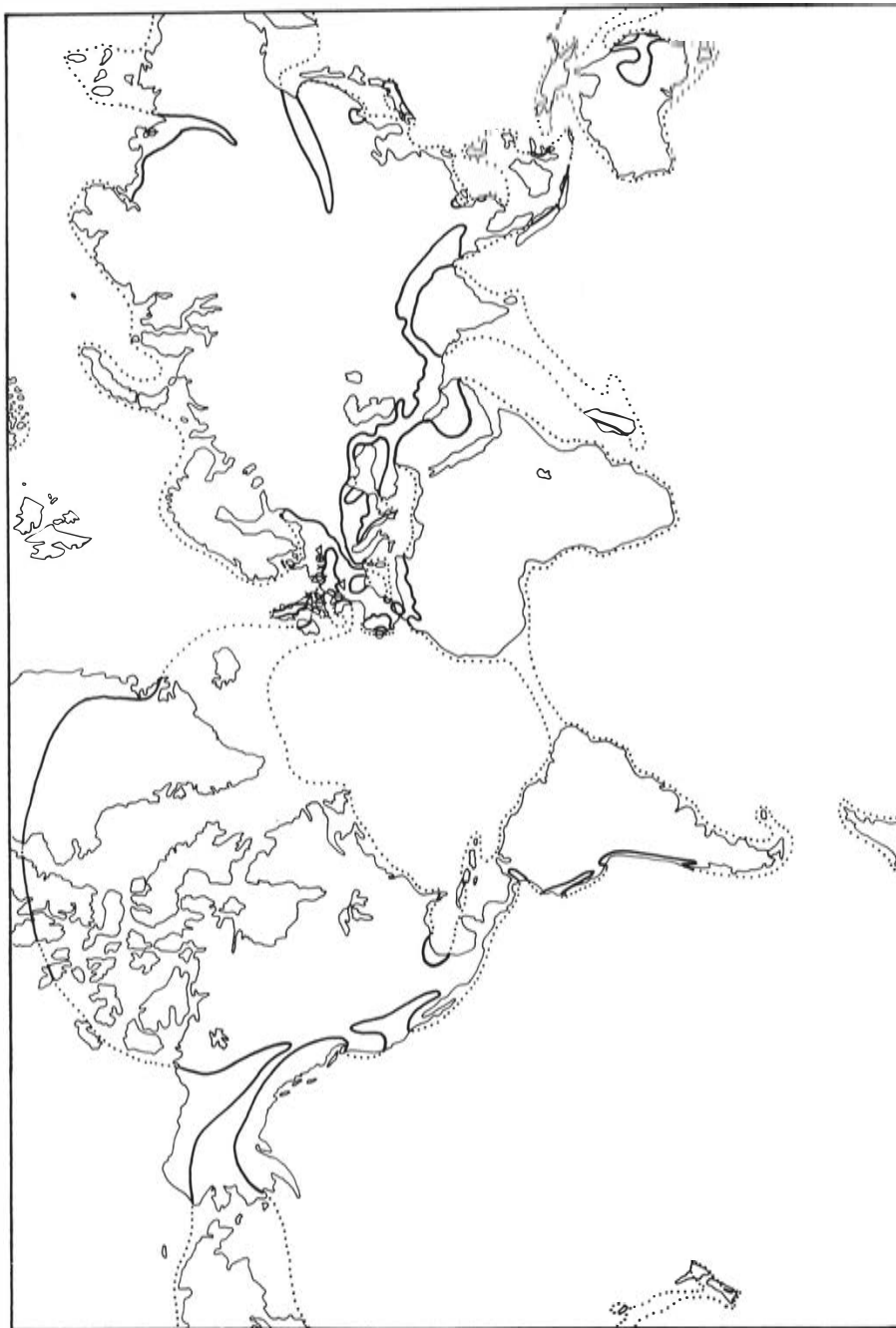


Fig. 2. The distribution of the Plesiosaurs. Lias. Paleo-geographic land-contours modified from TERMIER, H., and TERMIER, G. (1952, map no. 21). — Key to the signs: ○ Plesiosauridae; ⊕ Cimoliasauridae; ◆ Elasmosauridae; △ Rhomaleosauridae; □ Plotosauridae; ■ Polycotylidae; X Plesiosauria, fam., gen. et sp. indet.; — supposed ancient coastal line on present land; supposed ancient coastal line in present sea.

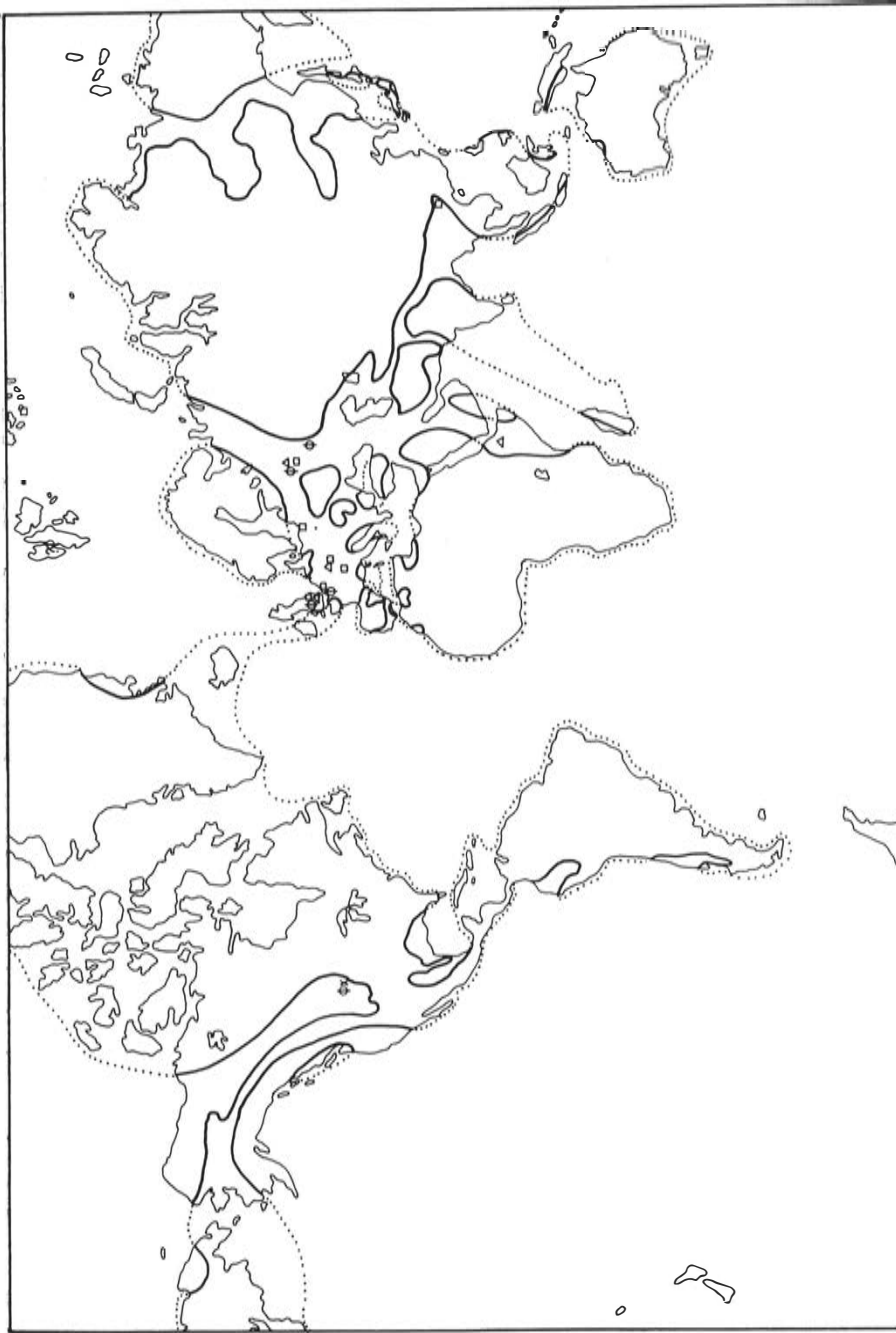


Fig. 3. The distribution of the Plesiosaurs. Callovian — Oxfordian. Paleogeographic land contours modified from TERMIER, H., and TERMIER, G. (1952, map no. 23). — Key to the signs, see fig. 2.

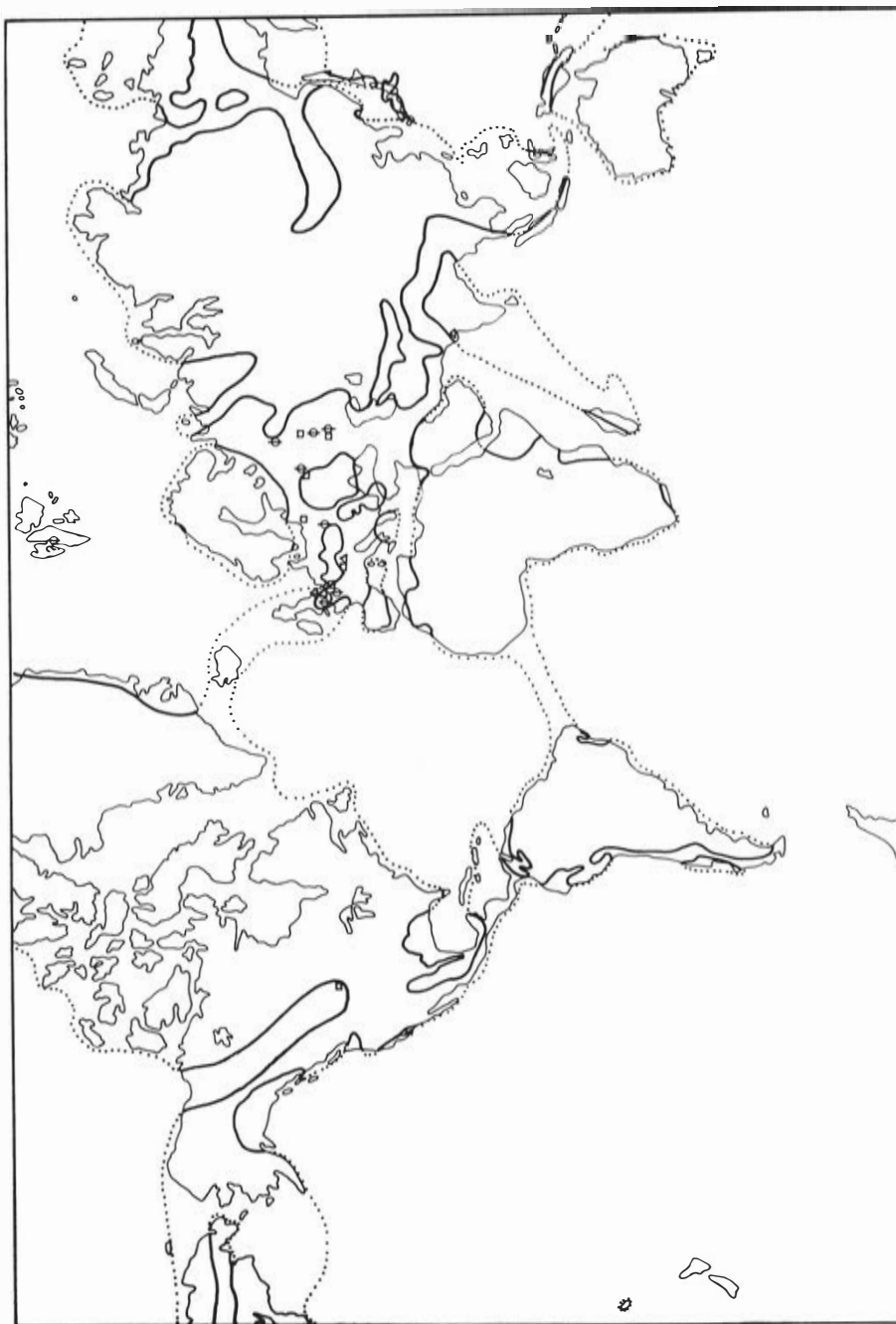


Fig. 4. The distribution of the Plesiosaurs. Kimmeridgian — Portlandian. Paleo-geographic land-contours modified from TERMIER, H., and TERMIER, G. (1952, map no. 24). — Key to the signs, see fig. 2.

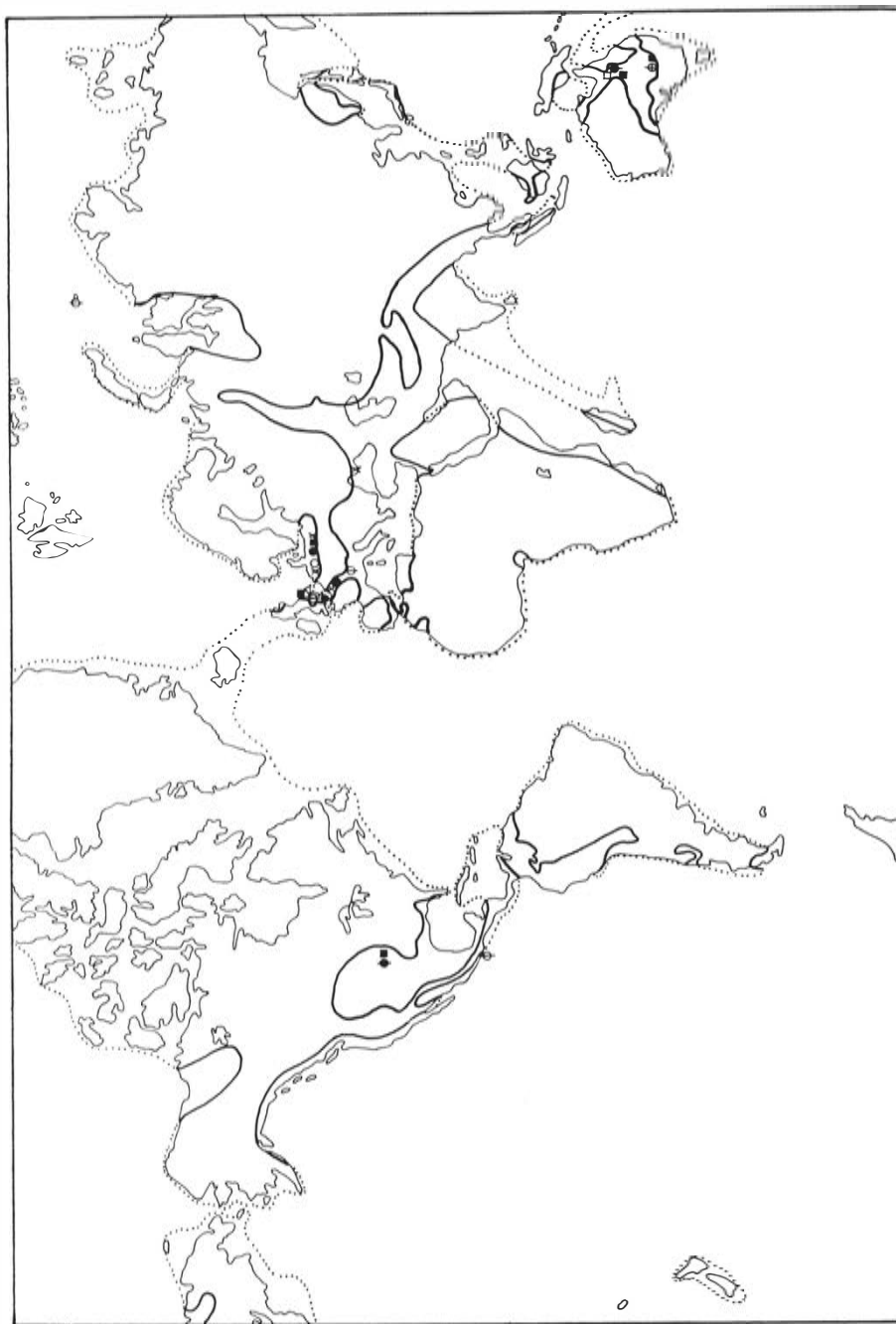


Fig. 5. The distribution of the Plesiosaurs. Neocomian — L. Albian. Paleo-geographic land-contours modified from TERMIER, H., and TERMIER, G. (1952, map no. 26). — Key to the signs, see fig. 2.



Fig. 6. The distribution of the Plesiosaurs. U. Albian — Cenomanian. Paleo-geographic land-contours modified from TERMIER, H., and TERMIER, G. (1952, map no. 27). — Key to the signs, see fig. 2.

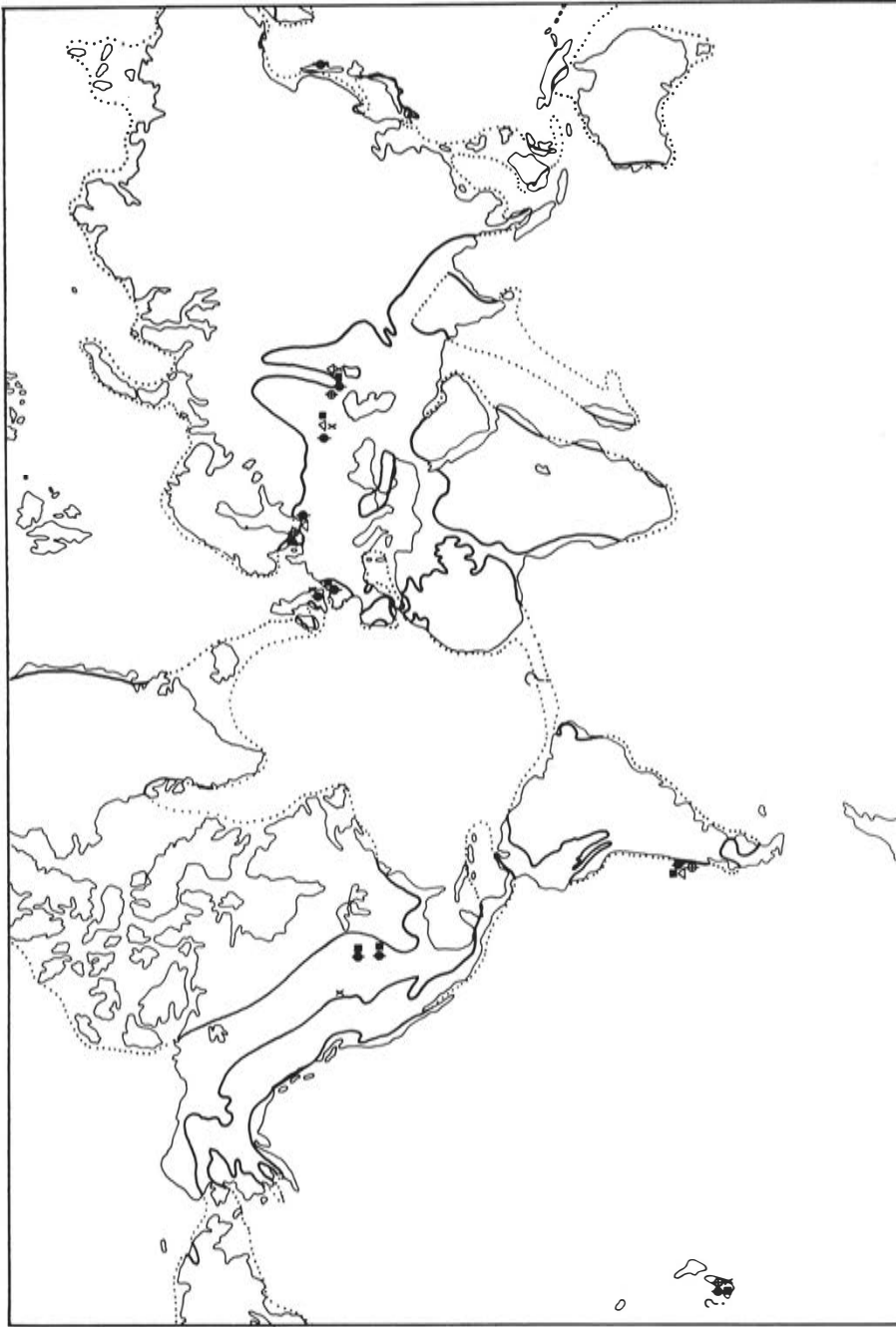


Fig. 7. The distribution of the Plesiosaurs. Santonian — Campanian. Paleo-geographic land-contours modified from TERMIER, H., and TERMIER, G. (1952, map no. 28). — Key to the signs, see fig. 2.



Fig. 8. The distribution of the Plesiosaurs, Maestrichtian. Paleo-geographic land-contours modified from TERMIER, H., and TERMIER, G. (1952, map no. 29). — Key to the signs, see fig. 2.

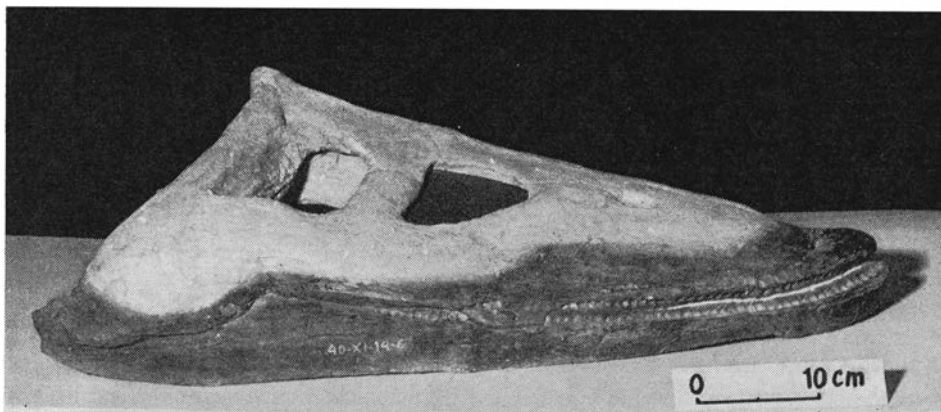


Fig. 9. *Aristonectes parvidens* CABRERA 1941. Cast of the restored skull and mandible.

3. Notes on selected genera and species

Aristonectes CABRERA 1941. — This genus shows typically Cimoliasauridean features; unfortunately I had not access to CABRERA's work when I wrote my definition of the Cimoliasauridae (PERSSON 1960, pp. 6—7), and hence *Aristonectes* was not mentioned among the genera of that family. — The genotype and only known species is *A. parvidens* [293]. This is so far the only Cimoliasaurid in which parts of the head skeleton are known (portions of the skull and mandible; see fig. 9). The skull is large (length 70 cm+); the teeth are relatively small and numerous. Apparently the dentition was fairly specialized. The length-height-breadth ratios of the cervical centra agree closely with those of the corresponding centra in certain specimens of the Cimoliasaurid *Scanisaurus* cf. *nazarowi* (BOGOLUBOV 1911) [168] (see PERSSON 1959, pp. 452—453).

Aristonectes is, according to CABRERA, of Maestrichtian age. If this is so, the genus in question must have been one of the latest off-shoots of the Cimoliasauridae, and of the Plesiosauria in general.

Brancaesaurus WEGNER 1914 — *B. brancai* [85], the only known representative of this genus, seems to be an "advanced Plesiosaurid". The number of the cervical vertebrae and the indices of their centra are definitely Plesiosauridean, and so is the shape of the propodial bones. However, if WEGNER's reconstruction is correct, the coracoids are separated posteriorly and are hence of the Elasmosauridean type.

WHITE (1940, p. 461) placed *Brancaesaurus* within a family of its own, the Brancaesauridae; WELLES (1943, p. 203) referred the species to the Elasmosauridae; and ROMER (1956, p. 666) placed it with his Thaumatosauridae (Rhomaleosauridae KUHN 1961; see footnote 1, p. 4). With regard to the facts that the Plesiosauridean characters are prevalent at least in the vertebral column, and that WEGNER's reconstruction of the pectoral girdle is somewhat doubtful, it seems most appropriate to place *Brancaesaurus* with the Plesiosauridae.

Brimosaurus LEIDY 1854. — The genus and the only species, *B. grandis* [247], are based upon a very scanty material (four cervical centra). — WELLES (1952, p. 112) recorded the genus and species among his *nomina vana*, but demonstrated that the form in question is probably closely related to *Cimoliasaurus*. In the present paper it is therefore referred to the Cimoliasauridae, gen. et sp. indet.

Cimoliasaurus LEIDY 1851 [4, 84, 280, 294, 305, 316; "*Cimoliasaurus*" 9, 15, 98, 126, 130, 131, 132, 145, 188, 189, 191, 296]. — This genus and its type species, *C. magnus* [280], have been thoroughly discussed by WELLES (1943, p. 209; 1952, pp. 107—110); see also PERSSON (1959, pp. 447—448; 1960, p. 7).

"*Cimoliasaurus*" *andium* DEECKE 1895 [296]. — The length-height-breadth ratios of the cervical vertebrae in this species are Rhomaleosauridean rather than Cimoliasauridean. DEECKE's description of the material is not quite unambiguous. In the text he referred a humerus to *Cimoliasaurus* without stating a specific name for it, but in the figure-text he named the same specimen *C. andium* (DEECKE 1895, pp. 58—60; Pl. 1, fig. 6a—c). It is not stated expressly that this bone belongs to the same individual as the vertebrae. I have seen a cast of the humerus, which is definitely of Cimoliasauridean or Elasmosauridean type.

Because of the shape of its cervical centra "*C.*" *andium* is here referred to the Rhomaleosauridae, but future finds will perhaps prove that we are here dealing with a Cimoliasaurid in which the cervical centra are higher and narrower than in the typical representatives of the Cimoliasauridae.

"*Cimoliasaurus*" *cantabrigiensis* LYDEKKER 1889 [9]. — This poorly-known species is very similar to, and possibly identical with "*Plesiosaurus*" *bernardi* OWEN 1850 [10, ?170, ?187] (see below, p. 20). Like the species just mentioned it is here referred to the Rhomaleosauridae.

Cimoliasaurus sp. [294]. — The immature cervical centrum described and figured by DEECKE (1895, pp. 61—63; Pl. 1, fig. 5) under this name has typically Cimoliasauridean proportions. It is very similar to the posterior cervical centra in *Scanisaurus* cf. *nazarovi* (BOGOLUBOV 1911) [168] (see PERSSON 1959, pp. 451—456).

Colymbosaurus sclerodirus BOGOLUBOV 1911 [194]. — Judging from BOGOLUBOV's description and figures the holotype of this species can hardly show any clearly specific characters, but since I have not seen the material I consider a provisional retention of the species preferable.

Elasmosaurus constrictus (OWEN 1850 [1]). — The best preserved of the two cervical centra which are the type material of this species has a length-height-breadth ratio which is definitely Elasmosauridean; furthermore, a sharp lateral longitudinal ridge is present. Apparently we are here dealing with an Elasmosaurid, but the material is not sufficient for a generic or specific definition.

"*Elasmosaurus*" *intermedius* COPE 1894 [260]. — Following WELLES (1952, pp. 114—115) I have placed this species among the Polycotylidae. However, the indices

of the vertebral centra would not contradict an assumption that the species belongs to the Rhomaleosauridae.

Elasmosaurus? kurskensis [177], *E. orskensis* [175] and *E.? serdobensis* [176]. — These three Russian species are based by BOGOLUBOV (1911) upon very poor material. They are probably Elasmosaurids, but their generic and specific definition is questionable. However, since I have not seen the holotypes I prefer to group the forms, provisionally at least, among the valid species.

Eretmosaurus SEELEY 1874 [61, 66, 74, ?157]. — The genotype, *E. rugosus* (OWEN 1840) [66, 74] was based upon a skeleton lacking skull and mandible, but otherwise almost complete. The neck is relatively long, hence indicating a Plesiosauroid, but the girdle bones, particularly the ischia, are clearly of the Rhomaleosauridean type. The genus is here referred to the Rhomaleosauridae.

The other known species of this genus, *E. (Plesiosaurus) dubius* (BLAKE 1876) [61], is quite inadequately described (TATE and BLAKE 1876, p. 246). The holotype, a nearly complete skeleton which was in private possession, cannot now be found. — WATSON (1911, p. 2) established that the pectoral girdle figured by BLAKE (1876, Pl. 1, fig. 7) is of the same type as the corresponding element in *Eretmosaurus*, and hence he referred BLAKE's "*Plesiosaurus*" *dubius* to the genus mentioned.

Leptocleidus ANDREWS 1922 [11, 222] (the type genus of the family Leptocleididae WHITE 1940; see above, p. 4). — The cervical vertebrae of the genotype, *L. superstes* [11], show certain typical Rhomaleosauridean characters (centra relatively short and high; end faces deeply concave, with rounded-off margins). ANDREWS (1922, pp. 291—295) demonstrated that the pectoral girdle agrees on important points with that of the liassic Rhomaleosaurid *Eurycleidus arcuatus* (OWEN 1840) [71]. The genus *Leptocleidus* is hence here referred to the Rhomaleosauridae. — ANDREWS further demonstrated that *L. superstes* and the South African species "*Plesiosaurus*" *capensis* ANDREWS 1911 [222] are probably congeneric. This being so, the generic name *Peyerus*, introduced by STROMER (1935, p. 44) for the African form mentioned, has no bearing. The species in question is therefore here referred to *Leptocleidus*. — In *L. capensis* the skull is well preserved. This is comparatively large, and there is a distinct constriction at the maxillo-premaxillary suture. The presence of these characteristics supports the assumption that *Leptocleidus* is a Rhomaleosauridean genus.

Mauisaurus HECTOR 1874 [3, 313, ?318]. — The material upon which the genotype, *M. haasti* [313], was based is fairly poor, but shows definitely Elasmosauridean characters. — *M. gardneri* SEELEY 1877 [3] is represented by the major part of a skeleton. This species was a large Elasmosaurid.

Microcleidus WATSON 1911 [50, 51, 115, ?116]. — This genus is very long-necked and small-headed. The number of cervical vertebrae is not extremely great — 40 in the type species, *M. homalospondylus* (OWEN 1865) [50, ?115, ?116] — but the centra of these vertebrae are very long, their length-height-breadth ratios being nearly the

same as in the corresponding centra in certain Elasmosaurids. Lateral longitudinal ridges are present in the anterior cervical centra. Also the pectoral and pelvic girdles show certain Elasmosauridean features (WATSON 1911, pp. 5—12). — An important non-Elasmosauridean character in *Microcleidus* is the absence of an interclavicle. Nevertheless, the genus discussed may be a conceivable ancestor of the Elasmosaurids.

Muraenosaurus elasmosauroides BOGOLUBOV 1911 [197], *M. fahrenheitii* (WALDHEIM 1846) [198] and *M. purbecki* BOGOLUBOV 1911 [199]. — The validity of these species is questionable, and their retention is provisional.

Plesiosaurus CONYBEARE 1824 [?53, 54, 55, ?56, ?57, ?58, ?78, ?79, ?117, 118, ?119, ?120, ?121, 127, 146, 147, ?148, 149, 150, ?151, ?152, ?153, ?160, ?161, ?162, ?212, ?297; “*Plesiosaurus*” 2, 5, 6, 10, 14, 21, 41, 42, 43, 48, 49, 52, 67, 68, 72, 73, 75, 76, 80, 86, 87, 88, 89, 91, 92, 95, 103, 123, 137, 138, 157, 170, 171, 186, 187, 190, 192, 224, 226, 261, 267, 269, 270, 271, 273, 278, 279, 284, 289, 314, 315, 319, 320]. — WHITE (1940, p. 461) wrote about this genus: “The genus *Plesiosaurus* has been and still is the wastebasket into which all unidentifiable scrap is dumped, usually with a new specific name”. This statement is certainly true. A great number of more or less well-defined “*Plesiosaurus*” species have appeared in the literature, but *Plesiosaurus sensu stricto* should perhaps not include more than three species, viz. *P. dolichodeirus* CONYBEARE 1824 [55, ?118, 149, ?150], *P. guilelmi imperatoris* DAMES 1895 [147], and *P. brachypterygius* v. HUENE 1923 [146].

“*Plesiosaurus*” *balticus* SCHRÖDER 1885 [171, ?186]. — SCHRÖDER (1885, p. 309) originally grouped this species among what he called “the short-necked Plesiosaurians”, essentially because of the shape of its vertebral centra. The species is probably a Pliosauroid, although its humerus shows certain Plesiosauroid characteristics. The shape of the teeth indicates a Rhomaleosaurid rather than a Pliosaurid or a Polycotylid, and the species is therefore here referred to the Rhomaleosauridae.

“*Plesiosaurus*” *bernardi* OWEN 1850 [10, ?170, ?187]. — This species is known from a few vertebrae only. The end faces of the centra are deeply concave and have rounded-off margins. The height of the cervical centra is a little greater than the length, and in some cases greater than the breadth as well. The rib facets are unusually large.

The species can hardly belong to any of the Plesiosauroid families, and probably it does not belong to the Pliosauridae or the Polycotylidae either. It is therefore here referred to the Rhomaleosauridae.

“*Cimoliasaurus*” *cantabrigiensis* [9] (see above, p. 18) is probably closely related to (or identical with) “*P*”. *bernardi*.

“*Plesiosaurus*” *conybeari* SOLLAS 1881 [52]. — The proportions of the skull, the shape of the teeth and the length of the mandibular symphysis in this species are Rhomaleosauridean rather than Plesiosauridean. On the other hand, the species is clearly dolichodiran, and the ischia are not elongate (see SOLLAS 1881, Pl. 23; *ibid.* text-fig. 6, p. 464). I have therefore here tentatively grouped “*P*”. *conybeari* among

the Plesiosauridae, but the species certainly does not belong to the genus *Plesiosaurus*.

The holotype and only known specimen of "*P*". *conybeari* (a nearly complete skeleton in the Bristol City Museum) was destroyed by enemy action in November, 1940.

"*Plesiosaurus*" *costatus* OWEN 1840 [75, 123], "*P*". *hawkinsi* OWEN 1840 [73, 76], "*P*". *macrocephalus* CONYBEARE 1824 [67, 72], and "*P*". *rostratus* OWEN 1865 [68]. — These species are Rhomaleosaurids, and hence they cannot belong to the genus *Plesiosaurus*. "*P*". *macrocephalus* and "*P*". *rostratus* should probably be referred to *Rhomaleosaurus*.

"*Plesiosaurus*" *holmesi* HECTOR 1874 [314] and "*P*". *hoodi* OWEN 1870 [315]. — Both species show certain Elasmosauridean characters, and are here referred to the Elasmosauridae, gen. et sp. indet. They are based upon very poor material. Possibly they are identical with each other, and (or) with *Mauisaurus haasti* [313] (see above, p. 19).

"*Plesiosaurus*" *mauretanicus* ARAMBOURG 1954 [224]. — The material is insufficient for a generic or specific identification. The proportions of the hindmost cervical centra indicate an Elasmosaurid.

"*Pliosaurus*" *chilensis* GERVAIS in GAY 1848 [295]. — The species is founded upon insufficient material (a single caudal vertebra); hence a generic or specific definition is impossible. However, the type specimen is obviously a Pliosauroid (COLBERT 1949, p. 18).

Most of the material which DEECKE (1895, pp. 36—50) referred to *P. chilensis* is non-Pliosauroid (see COLBERT 1949, pp. 17—19). Only some cervical vertebrae in the material mentioned can belong to the same form as the type specimen.

"*P*". *chilensis* is here provisionally grouped among the Polycotylidae, gen. et sp. indet.

Polycotylus brevispondylus [182], *P. epigurgitis* [183], *P. ichthyospondylus* var. *tanais* [184], *P. orientalis* [180] and *P. ultimus* [181]. — BOGOLUBOV (1911) founded these species upon a very scanty material, and their validity is not certain, but since I have not seen the holotypes I have here grouped the forms provisionally among the valid species.

Seeleyosaurus WHITE 1940. — WHITE (1940, p. 463) founded the type species of this genus, *S. holzmadenensis*, upon a juvenile skeleton previously described by FRAAS (1910, pp. 107—123), who considered the specimen as a representative of *Plesiosaurus guilelmi imperatoris* DAMES 1895 [147]. As emphasized by WELLES (1943, pp. 197—198) the distinctive features adduced by WHITE (certain characters in the skull and the pectoral girdle) are of questionable value. *S. holzmadenensis* is here regarded as a synonym of *P. guilelmi imperatoris*.

Termatosaurus alberti TH. PLIENINGER 1844 [77, 156]. — This Rhomaleosauridean species is based upon teeth only. BROWN (1894, pp. 748—749) considered *T. alberti* and "*Plesiosaurus*" *rostratus* OWEN 1865 [68] as synonyms. However, the

synonymy seems to be extremely doubtful, and is hence not adopted in the present paper.

Woolungasaurus PERSSON 1960 [298, 299, 300]. — In certain respects this genus seems to be intermediate between the Plesiosauridae and the Elasmosauridae, though the Elasmosauridean characters are clearly prevalent (PERSSON 1960, pp. 15—16).

Undescribed Plesiosauridean specimens from the Island of Eigg [32]. — This material has a particular interest, being the only Plesiosaurian remains from the British Isles outside England. Some of the specimens, which I have seen, are undoubtedly of the Plesiosauridean type. — I am indebted to the collector of the fossils, Dr. B. H. NEWMAN, of the British Museum, London, for the following account:

“In July 1844 the celebrated geologist HUGH MILLER visited the Island of Eigg, one of the Inner Hebrides off the west coast of Scotland. At the north end of the island, at a promontory called Ru-Stoir, he discovered reptilian and fish remains in loose blocks of limestone strewn along the foreshore (MILLER 1858, p. 75). He again visited Eigg in the summer of 1845 and found the reptile bed *in situ* on the foreshore at a point on the east coast about one and a half miles north of Kildonan Cottage (*Ibid.*, p. 222). The fossils collected during these two visits are now housed in the Royal Scottish Museum at Edinburgh.

During the late nineteen-fifties J. D. HUDSON, then a research student at Cambridge, was working on the stratigraphy of Eigg. Three reptile specimens he collected there stimulated fresh interest within the Department of Paleontology of the British Museum, (Natural History); B. H. NEWMAN of that department collected reptile and fish specimens in the island in 1961, and later re-examined the original Miller collection.

The reptile bed is part of the Great Estuarine Series and therefore of Bathonian (Middle Jurassic) age (HUDSON 1960, p. 313). The bed itself consists of from six to twelve inches of a hard, dark grey, shelly limestone which weathers to a pinkish red on the surface and is rich in bone fragments, fish scales and molluscs (HARKER and BARROW 1908, p. 22).

Many of the specimens collected in 1961 have been prepared with acetic acid. There is much plesiosaur material: an exoccipital, teeth, cervical, dorsal, and caudal vertebrae, a caudal rib, an immature left ischium, phalanges and a portion of the plastron. Other material includes the fragmentary remains of chelonians, crocodilians and ichthyosaurs, *Lepidotus* teeth, the dorsal fin spines of *Acrodus* or *Hybodus*, and coelacanth scales (HARKER and BARROW 1908, p. 22).

None of the specimens was found certainly associated although often close together; in many cases relative size approximation could be an indication of the bones being from the same individual. It would not seem wise to attempt at this stage to allocate the plesiosaur remains to any particular genus; further collecting may yield more diagnostic material. For the present it may be said that these remains represent a small plesiosaur similar in size to the small Liassic species *Plesiosaurus dolichodeirus* CONYBEARE 1824.”

4. Tabular Synopsis of the Distribution of the Plesiosaurians

	Complete or nearly complete skeleton
	Skull or part of skull
	Mandible or part of mandible
	Teeth
	Vertebrae or vertebral centra
	Girdle bones
	Limb bones

The British Isles

U. Cretaceous

Elasmosauridae, gen. et sp. indet.

1. *Elasmosaurus constrictus* (OWEN 1850)
"Chalk". Steyning (England)



Plesiosauria, fam., gen. et sp. indet.

2. "*Plesiosaurus*" *smithi* OWEN 1882 U.
Chalk. Kent (England)



L. Cretaceous

Elasmosauridae

3. *Mauisaurus gardneri* SEELEY 1877 L.
Albian. Folkestone (England)



Cimoliasauridae

4. *Cimoliasaurus planus* (OWEN 1864) U.
Greensand (U. Albian). Cambridge
(England)



Plesiosauridae

5. "*Plesiosaurus*" *latispinus* OWEN 1854

L. Greensand (Aptian). Maidstone (England)

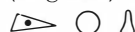


6. "*Plesiosaurus*" *valdensis* LYDEKKER
1889 Wealden. Hastings (England)



Polycotyliidae

7. *Polyptychodon interruptus* OWEN 1841
U. Greensand (U. Albian). Cambridge
(England)



8. *Polyptychodon continuus* OWEN 1841
L. Greensand (Aptian). Maidstone (England)



Rhomaleosauridae

9. "*Cimoliasaurus*" *cantabrigiensis* LYDEKKER 1889 U. Greensand (U. Albian).
Cambridge (England)



10. "*Plesiosaurus*" *bernardi* OWEN 1840
Neocomian. Reach etc. (England)



11. *Leptocleidus superstes* ANDREWS 1922
Wealden. Berwick (England)



U. and M. Jurassic

Plesiosauridae

12. *Colymbosaurus? megapleuron* (OWEN 1854) ?Portlandian. ?Isle of Portland (England)



13. *Colymbosaurus? portlandicus* (OWEN 1869) Portlandian. Isle of Portland (England)



14. "*Plesiosaurus*" *phillipsi* SAUVAGE 1879
Portlandian. Quanton (England)



15. "*Cimoliasaurus*" *brevior* LYDEKKER 1889 Kimmeridge Clay. Weymouth (England)



16. *Colymbosaurus? brachistospondylus* HULKE 1870 Kimmeridge Clay. Kimmeridge Bay (England)



17. *Colymbosaurus manseli* HULKE 1870 Kimmeridge Clay. Kimmeridge Bay (England)



18. *Colymbosaurus megadeirus* SEELEY 1869 Kimmeridge Clay. Ely (England)



19. *Colymbosaurus? trochanterius* (OWEN 1840) Kimmeridge Clay. Wiltshire (England)



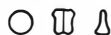
20. *Muraenosaurus truncatus* (LYDEKKER 1889 ex OWEN 1854) Kimmeridge Clay. Oxfordshire (England)



21. "*Plesiosaurus*" *ellipso-spondylus* PHILLIPS 1871 Kimmeridge Clay. Shotover (England)



22. *Apractocleidus teretipes* SMELLIE 1915 Oxford Clay. Peterborough (England)



23. *Cryptocleidus eurymerus* (PHILLIPS 1871) Oxford Clay. Bedford (England)



24. *Cryptocleidus oxoniensis* (PHILLIPS 1871) Oxford Clay. Oxford etc. (England)



25. *Cryptocleidus richardsoni* (LYDEKKER 1889) Oxford Clay. Weymouth (England)



26. *Muraenosaurus leedsi* SEELEY 1874 Oxford Clay. Peterborough (England)



27. *Muraenosaurus plicatus* (PHILLIPS 1871) Oxford Clay. Summertown (England)



28. *Picrocleidus beloclis* SEELEY 1892 Oxford Clay. Peterborough (England)



29. *Tremamesacleis durobrivensis* (LYDEKKER 1889) Oxford Clay. Peterborough (England)



30. *Tremamesacleis platyclis* (SEELEY 1892) Oxford Clay. Peterborough (England)



31. *Tricleidus seeleyi* ANDREWS 1909 Oxford Clay. Peterborough (England)



Plesiosauridae, gen. et sp. indet.

32. Undescribed specimens collected by Mr. B. NEWMAN (see above, p. 22) Bathonian. Isle of Eigg (Inner Hebrides)



Pliosauridae

33. *Pliosaurus brachydeirus* OWEN 1841 Kimmeridge Clay. Market Rasen (England)



34. *Pliosaurus brachyspondylus* (OWEN 1839) Kimmeridge Clay. Ely (England)



35. *Stretosaurus macromerus* (PHILLIPS 1871) Kimmeridge Clay. Shotover, Stretham etc. (England)



36. *Liopleurodon ferox* SAUVAGE 1873 Oxford Clay. Peterborough (England)



37. *Liopleurodon pachydeirus* (SEELEY 1869) Oxford Clay. Peterborough etc. (England)



38. *Peloneustes philarchus* (SEELEY 1869) Oxford Clay. Peterborough (England)



39. *Pliosaurus andrewsi* TARLO 1960 Oxford Clay. Peterborough (England)



40. *Pliosaurus gamma* PHILLIPS 1871 Oxford Clay. Weymouth (England)



Pliosauridae, gen. et sp. indet.

41. "*Plesiosaurus*" *giganteus* CONYBEARE 1824 Kimmeridge Clay. Weymouth etc. (England)



42. "*Plesiosaurus*" *recentior* PARKINSON 1822. See TARLO (1960, p. 179)

43. "*Plesiosaurus*" *simplex* PHILLIPS 1871 Kimmeridge Clay. Shotover (England)



44. *Pliosaurus aequalis* PHILLIPS 1871 Kimmeridge Clay. Swindon (England)



45. *Pliosaurus planus* HULKE 1883 Kimmeridge Clay. Shotover (England)



Rhomaleosauridae

46. *Rhomaleosaurus?* *carinatus* (CUVIER 1829) Kimmeridge Clay. Shotover (England)



47. *Simolestes vorax* ANDREWS 1909 Oxford Clay. Peterborough (England)



Plesiosauria, fam., gen. et sp. indet.

48. "*Plesiosaurus*" *affinis* OWEN 1840 Kimmeridge Clay. Heddington etc. (England)



49. "*Plesiosaurus*" *ellipso-spondylus* PHILLIPS 1871 Kimmeridge Clay. Shotover (England)



L. Jurassic and Triassic

Plesiosauridae

50. *Microcleidus homalospondylus* (OWEN 1840) U. Lias, zone of *Hildoceras bifrons*. Whitby (England)



51. *Microcleidus macropterus* (SEELEY 1865) U. Lias, zone of *Hildoceras bifrons* (? subzone of *Dactyloceras commune*). Lofthouse (England)



52. "*Plesiosaurus*" *conybeari* SOLLAS 1881 L. Lias, zone of *Asteroceras obtusum*. Charmouth (England)



53. *Plesiosaurus?* *subtrigonus* OWEN 1840 L. Lias, zone of *Arietites bucklandi*. Weston (England)



54. *Plesiosaurus macromus* OWEN 1840 L. Lias, "marl". Lyme Regis (England)



55. *Plesiosaurus dolichodeirus* CONYBEARE 1824 L. Lias, zone of *Psiloceras planorbis*. Lyme Regis etc. (England)



56. *Plesiosaurus?* *eleutheraxon* SEELEY 1865 L. Lias, ?zone of *Psiloceras planorbis*. Lyme Regis (England)



57. *Plesiosaurus?* cf. *bitractus* SAUVAGE 1883 L. Lias or Rhaetic. Westbury-on-Severn (England)



Plesiosauridae, gen. et sp. indet.

58. *Plesiosaurus?* *platydeirus* OWEN 1854 (non SEELEY 1869). See DELAIR (1959, p. 56) L. Lias, ?zone of *Psiloceras planorbe*. Lyme Regis (England)



Rhomaleosauridae

59. *Romaleosaurus cramptoni* (CARTE and BAILY 1863) U. Lias, u. part of the zone of *Hildoceras bifrons*. Kettleness (England)



60. *Rhomaleosaurus thornstoni* ANDREWS 1922 U. Lias. Kingsthorpe, Northamptonshire (England)



61. *Eretmosaurus dubius* BLAKE 1876 U. Lias, zone of *Hildoceras bifrons* (?subzone of *Dactyloceras commune*). Whitby (England)



62. *Rhomaleosaurus zetlandicus* (PHILLIPS 1854) U. Lias, zone of *Hildoceras bifrons* (?subzone of *Dactyloceras commune*). Lofthouse (England)



63. *Sthenarosaurus dawkinsi* WATSON 1911 U. Lias, zone of *Hildoceras bifrons* (?subzone of *Dactyloceras commune*). Saltwick (England)



64. *Macroplata longirostris* (BLAKE 1876) U. Lias, zone of *Harpoceras falcifer*. Whitby (England)

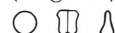


65. *Rhomaleosaurus?* *propinquus* (BLAKE 1876) U. Lias, zone of *Harpoceras falcifer*. Whitby (England)



66. *Eretmosaurus rugosus* (OWEN 1840) L. Lias, zone of *Asteroceras obtusum* (?sub-

zone of *Asteroceras stellare*). Granby (England)



67. "*Plesiosaurus*" *macrocephalus* CONYBEARE 1824 L. Lias, zone of *Arietites bucklandi*. Bitton (England)



68. "*Plesiosaurus*" *rostratus* OWEN 1865 L. Lias, zone of *Arietites bucklandi*. Charmouth (England)



69. *Eurycleidus megacephalus* (STUTCHBURY 1846) L. Lias, ?zone of *Schlotheimia angulata*. Street (England)



70. *Macroplata tenuiceps* SWINTON 1930 L. Lias, zone of *Schlotheimia angulata*. Harbury (England)



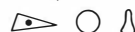
71. *Eurycleidus arcuatus* (OWEN 1840) L. Lias, ?zone of *Psiloceras planorbe*. Bitton etc. (England)



72. "*Plesiosaurus*" *macrocephalus* CONYBEARE 1824 L. Lias, zone of *Psiloceras planorbe*. Lyme Regis (England)



73. "*Plesiosaurus*" *hawkinsi* OWEN 1840 L. Lias, "Ostrea-beds". Street etc. (England)



74. *Eretmosaurus rugosus* OWEN 1840 Rhaetic. Aust Cliff (England)



75. "*Plesiosaurus*" *costatus* OWEN 1840 Rhaetic. Aust Cliff (England)



76. "*Plesiosaurus*" *hawkinsi* OWEN 1840 Rhaetic. Aust Cliff (England)



77. *Termatosaurus alberti* TH. PLIENINGER 1844 Rhaetic. Aust Cliff (England)



Plesiosauria, fam., gen. et sp. indet.

78. *Plesiosaurus? coelospondylus* OWEN 1865
U. Lias. Whitby (England)

○

79. *Plesiosaurus? erraticus* PHILLIPS 1871
L. Oolite. Stonesfield (England)

?∩ ○ ?△

North-western continental Europe

U. Cretaceous

Elasmosauridae, gen. et sp. indet.

80. "*Plesiosaurus*" *houzeaui* DOLLO 1909
U. Senonian. Hainault (Belgium)

○ △

81. Undescribed specimen in the Royal
Institute of Natural Science, Brussels
Senonian, "Craie phosphatique". Cues-
nes (Belgium)

○

Polycotylidae, gen. et sp. indet.

82. Undescribed specimen in the Royal
Institute of Natural Science, Brussels
L. Senonian. Lonzée (Belgium)

○

L. Cretaceous

Elasmosauridae, gen. et sp. indet.

83. Undescribed specimen in the National
Museum of Natural History, Paris Al-
bian. Grandpré (N. France)

○

Cimoliasauridae

84. *Cimoliasaurus planus* (OWEN 1864) Al-
bian. Louppy (N. France)

○

Plesiosauridae

85. *Brancaesaurus brancai* WEGNER 1914
Wealden. Gronau (N. W. Germany)

↔

86. "*Plesiosaurus*" *degenhardti* KOKEN 1887
Wealden. Bückeberg (N. W. Germany)

○ △

87. "*Plesiosaurus*" *limnophilus* KOKEN 1887
Wealden. Ummeln (N. W. Germany)

○

88. "*Plesiosaurus*" *valdensis* LYDEKKER
1889 Wealden. Gronau (N. W. Ger-
many)

○

Plesiosauridae, gen. et sp. indet.

89. "*Plesiosaurus*" *kanzleri* KOKEN 1905
Wealden. Gronau (N. W. Germany)

○

Polycotylidae

90. *Polyptychodon interruptus* OWEN 1840
Albian. Louppy (N. France)

!

Plesiosauria, fam., gen., et sp. indet.

91. "*Plesiosaurus*" *latispinus* OWEN 1854
Albian. Grandpré (N. France)

○

92. "*Plesiosaurus*" *pachyomus* OWEN 1840
Albian. Grandpré (N. France)

○

93. A specimen mentioned by LYDEKKER
(1889, p. 220, no. 33180) Albian. Port-
du-Rhône (France)

△

U. and M. Jurassic

Plesiosauridae

94. *Colymbosaurus? portlandicus* (OWEN
1869) U. Portlandian. Auvringhen
(N. W. France)

○

95. "*Plesiosaurus*" *phillipsi* SAUVAGE 1879
U. Portlandian. Boulogne-sur-mer
(N. W. France)

○

96. *Colymbosaurus? cf. trochanterius* (OWEN
1840) M. Portlandian. Tour Croy, near
Wimereux (N. W. France)

○

97. *Cryptocleidus? beaugrandi* SAUVAGE
1912 U. and M. Kimmeridgian, Bou-
logne-sur-mer (N. W. France)

○

98. "*Cimoliasaurus*" *brevior* LYDEKKER 1889 M. Kimmeridgian, zone of *Aulacostephanus pseudomutabilis*. Boulogne-sur-mer (N. W. France)

○

99. *Muraenosaurus truncatus* (LYDEKKER 1889 *ex* OWEN 1859) L. Kimmeridgian. Boulogne-sur-mer (N. W. France)

○

100. *Muraenosaurus plicatus* (PHILLIPS 1871) M. Callovian, zone of *Erymnoceras coronatum*. Montaubert etc. (N. W. France)

○

101. "*Muraenosaurus*" *mazetieri* BIGOT 1938 L. Callovian. Argences (N. W. France)

◐

102. *Muraenosaurus*? sp. SAUVAGE 1912 Bathonian. Boulogne-sur-mer (N. W. France)

○

Plesiosauridae, gen. et sp. indet.

103. "*Plesiosaurus*" *ellipsopondylus* PHILLIPS 1871 U. Kimmeridgian. Auvringhen etc. (N. W. France)

○

104. *Colymbosaurus dutertrei* SAUVAGE 1879 Kimmeridgian. Boulogne-sur-mer (N. W. France)

○

Pliosauridae

105. *Pliosaurus brachydeirus* OWEN 1841. See TARLO (1960, pp. 152 and 179) U. Portlandian. La Poterie, Boulogne-sur-mer (N. W. France)

○

106. *Stretosaurus macromerus* (PHILLIPS 1871). See TARLO (1960, p. 160) Kimmeridgian. Cap de la Hève (N. W. France)

∩

107. *Liopleurodon ferox* SAUVAGE 1873 Oxfordian. Wast, near Boulogne-sur-mer (N. W. France)

∩

108. *Liopleurodon* cf. *ferox* SAUVAGE 1873. Specimens described by BIGOT (1938, pp. 634—636); see TARLO (1960, pp. 165—166) Callovian. Argences (N. W. France)

∩

109. *Liopleurodon grossouvrei* SAUVAGE 1873 Callovian. Charly in Cher (centr. France)

∩

110. *Liopleurodon pachydeirus* (SEELEY 1869). A specimen described by FOLLET (1949); see TARLO (1960, p. 167) Bathonian. Ecouché (N. W. France)

∩

Pliosauridae, gen. et sp. indet.

111. "*Polycotylus*" *suprajurensis* SAUVAGE 1876. See TARLO (1960, p. 179) U. Kimmeridgian. Boulogne-sur-mer (N. W. France)

∩

Rhomaleosauridae

112. *Rhomaleosaurus*? *carinatus* CUVIER 1829 Portlandien — M. Kimmeridgian. Boulogne-sur-mer etc. (N. W. France)

○

113. *Rhomaleosaurus*? *morincinus* SAUVAGE 1879 M. Kimmeridgian, zone of *Aulacostephanus pseudomutabilis*. Boulogne-sur-mer (N. W. France)

○

Plesiosauria, fam., gen. et sp. indet.

114. *Haematosaurus lanceolatus* SAUVAGE 1874 (?non-Plesiosaurian) M. Kimmeridgian, zone of *Aulacostephanus pseudomutabilis*. Châtillon (N. W. France)

∩

L. Jurassic and Triassic

Plesiosauridae

115. *Microcleidus* cf. *homalospondylus* (OWEN 1840) M. Lias, zone of *Amaltheus margaritatus*. Jeandelaincourt (N. E. France)

○

116. *Microcleidus?* cf. *homalospondylus* (OWEN 1840). This specimen was described by v. BENEDEN (1882, pp. 1—34) as *Plesiosaurus latispinus* M. Lias. Dampicourt (Luxembourg)



117. *Plesiosaurus?* *dewalqui* v. BENEDEN 1882 M. Lias. Dampicourt (Luxembourg)



118. *Plesiosaurus* cf. *dolichodeirus* CONYBEARE 1824 M. Lias, zone of *Amaltheus margaritatus*. Jeandelaincourt (N. E. France)



119. *Plesiosaurus?* *pentagonus* CUVIER 1824 ?L. Lias. Calvados (N. W. France)



120. *Plesiosaurus?* *trigonus* CUVIER 1824 ?L. Lias. Calvados (N. W. France)



121. *Plesiosaurus?* *bitractus* SAUVAGE 1883 Rhaetic. Autun (centr. France)



Rhomaleosauridae

122. *Sthenosaurus dawkinsi* WATSON 1911 M. Lias, zone of *Amaltheus margaritatus*. Jeandelaincourt (N. E. France)



123. "*Plesiosaurus*" *costatus* OWEN 1840 Rhaetic. Autun; La Coudre (centr. France)



Pistosauridae

124. *Pistosaurus?* cf. *grandaevus* H. v. MEYER 1855 Muschelkalk. Mont etc. (N. E. France)



125. *Pistosaurus* ? sp. CORROY 1928, p. 41 Muschelkalk. Mont etc. (N. E. France)



South-western Europe

U. Cretaceous

Rhomaleosauridae, gen. et sp. indet.

126. "*Cimoliasaurus*" sp. SAUVAGE 1897—1898 Cenomanian. Alcantara (Portugal)



L. Jurassic and Triassic

Plesiosauridae

127. *Plesiosaurus* sp. SAUVAGE 1897—1898 (? aff. *dolichodeirus*; see SAUVAGE 1898a, p. 442) Charmouthian or Toarcian. Alhadas (Portugal)



Central Europe

U. Cretaceous

Polycotylidae

128. *Polyptychodon?* cf. *interruptus* OWEN 1841 Turonian. Bile Hory, near Prague (Bohemia)



129. *Polyptychodon* cf. *interruptus* OWEN 1841 M. Turonian. Zamost (Bohemia)



Plesiosauria, fam., gen. et sp. indet.

130. "*Cimoliasaurus*" *lissaensis* FRITSCH 1905 Turonian. Lysa, near Labem (Bohemia)



131. "*Cimoliasaurus*" *teplicensis* FRITSCH 1905 Turonian. Crast (Bohemia)



132. "*Cimoliasaurus*" *vicinus* FRITSCH 1905 Turonian. Hundorf, near Teplitz (Bohemia)



133. *Hunosaurus fasseli* FRITSCH 1905 Turonian. Hundorf, near Teplitz (Bohemia)



134. *Iserosaurus litoralis* FRITSCH 1905 (?non-Plesiosaurian) Turonian. Milovice (Bohemia)



135. Specimens described by AUGUSTA and SOUKUP (1940, pp. 25—26) Turonian. Trebovice (Bohemia)



L. Cretaceous

Elasmosauridae, gen. et sp. indet.

136. Specimen described by KOKEN (1883, pp. 786—788) as *Plesiosaurus* sp. III. Neocomian, "Hilsthon". Kirchwehren (N. centr. Germany)



Plesiosauridae, gen. et sp. indet.

137. "*Plesiosaurus*" *gurgitis* PICTET and RENEVIER 1858 Neocomian (?Aptian). St. Croix (Switzerland)



138. "*Plesiosaurus*" *neocomiensis* CAMPICHE 1860 Neocomian. St. Croix (Switzerland)



Polycotylidae

139. *Polyptychodon* cf. *interruptus* OWEN 1841 Neocomian, "Hilsthon". Langelsheim etc. (N. centr. Germany)



Plesiosauria, fam., gen. et sp. indet.

140. Specimens described by KOKEN (1883, pp. 780—786) as *Plesiosaurus* I and II Neocomian, "Hilsthon". Steinlah, near Salzgitter (N. centr. Germany)



U. and M. Jurassic

Plesiosauridae, gen. et sp. indet.

141. *Cryptocleidus kimmeridgensis* HIRZBERG 1924 Kimmeridgian. Pieklo (S. Poland)

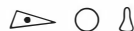


Pliosauridae

142. *Liopleurodon* cf. *ferox* SAUVAGE 1873. A specimen described by H. v. MEYER (1865a, pp. 19—21) as *Ischyrodon meriani*; see TARLO (1960, p. 177) Oxfordian. Argau Canton (Switzerland)



143. *Liopleurodon ferox* SAUVAGE 1873. A specimen described by v. HUENE (1934, pp. 31—46); see TARLO (1960, pp. 165 and 166) U. Callovian, "Ornatenton". Near Lauffen (S. Germany)



Rhomaleosauridae, gen. et sp. indet.

144. *Thaumatosauros oolithicus* H. v. MEYER 1841. See TARLO (1960, p. 178) ?Oxfordian. Württemberg (S. Germany)



Plesiosauria, fam., gen. et sp. indet.

145. "*Cimoliasaurus*" *hirzbergi* KUHN 1934. HIRZBERG (1924, pp. 221—222) described the specimen and named it *Cimoliasaurus portlandicus* n. sp., but the specific name was preoccupied by OWEN (1869). Portlandian. Brzostowka (S. Poland)



L. Jurassic and Triassic

Plesiosauridae

146. *Plesiosaurus brachypterygius* v. HUENE 1923 U. Lias (ε), "Posidonienschiefer". Holzmaden (S. Germany)



147. *Plesiosaurus guilelmi imperatoris* DAMES 1895 U. Lias (ε), "Posidonienschiefer". Holzmaden (S. Germany)



148. *Plesiosaurus?* *nothosauroides* DAMES 1895 L. Lias (α), zone of *Arnioceras semicostatum*. Straßburg bei Gmünd (S. Germany)



149. *Plesiosaurus dolichodeirus* CONYBEARE 1824 L. Lias (α), zone of *Arietites bucklandi*. Langenbrückener Senke (S. Germany)



150. *Plesiosaurus* cf. *dolichodeirus* CONYBEARE 1824 L. Lias (α), zone of *Arietites bucklandi*. Vaihingen (S. Germany)



151. *Plesiosaurus?* *robustus* DAMES 1895 L. Lias (α), zone of *Arietites bucklandi*. Schaichhof (S. Germany)

○ ▽

152. *Plesiosaurus?* *keuperinus* v. HUENE 1929 U. Keuper. Halberstadt (N. centr. Germany)

○

153. *Plesiosaurus?* *baruthicus* KUHN 1934 U. Muschelkalk. Bayreuth (centr. Germany)

○

Rhomaleosauridae

154. *Rhomaleosaurus victor* (FRAAS 1910) U. Lias (ϵ). Near Holzmaden (S. Germany)

↔

155. *Eurycleidus* cf. *megacephalus* (STUTCHBURY 1846) L. Lias (α), zone of *Psiloceras planorbe*. Kanonenberg, near Halberstadt (N. centr. Germany)

↔

156. *Termatosaurus alberti* TH. PLIENINGER 1844 Rhaetic. Württemberg (S. Germany)

! ? ○

Rhomaleosauridae, gen. et sp. indet.

157. "*Plesiosaurus*" (*Eretmosaurus?*) *bavarius* DAMES 1895 U. Lias. Görtz (S. Germany)

○

Pistosauridae

158. *Pistosaurus grandaevus* H. v. MEYER 1855 U. Muschelkalk. Bayreuth (centr. Germany)

▷

159. *Pistosaurus longaevus* H. v. MEYER 1839 U. Muschelkalk. Bayreuth (centr. Germany)

▷

Plesiosauria, fam., gen. et sp. indet.

160. *Plesiosaurus?* *posidoniae* QUENSTEDT 1858 U. Lias (ϵ), "Posidonienschiefer". Reutlingen (S. Germany)

▽

161. *Plesiosaurus?* *suevicus* QUENSTEDT 1858 U. Lias (ϵ). Frittlingen (S. Germany)

○

162. *Plesiosaurus?* sp. Specimen described by DAMES (1895, pp. 11—12) L. Lias (α), zone of *Arietites bucklandi*. Hüttlingen (S. Germany)

▽

The Baltic Region

U. Cretaceous

Elasmosauridae

163. *Elasmosaurus?* *gigas* (SCHRÖDER 1885) ?U. Senonian. Altfelde bei Elbing (Prussia)

○

164. *Elasmosaurus?* cf. *gigas* (Schröder 1885) L. Campanian. Ignaberga (Scania)

○

165. "*Elasmosaurus*" *helmerseni* (KIPRIJANOFF 1882) ?U. Senonian. Gumbinnen (Prussia)

○

166. "*Elasmosaurus*" cf. *helmerseni* (KIPRIJANOFF 1882) L. Campanian. Ignaberga (Scania)

○

Elasmosauridae, gen. et sp. indet.

167. Specimens described by PERSSON (1959, pp. 459—460) ?L. Maestrichtian, Balsvik; L. Campanian, Axeltorp, Ignaberga, Ivö (Scania)

○ ▭

Cimoliasauridae

168. *Scanisaurus* cf. *nazarowi* (BOGOLUBOV 1911) L. Campanian. Ignaberga, Ivö etc. (Scania)

! ○ ▭ ▽

Polycotylidae, gen. et sp. indet.

169. Specimens described by PERSSON (1959, pp. 441—443) L. Campanian. Ignaberga; Ivö (Scania)

! ○

Rhomaleosauridae

170. "*Plesiosaurus*" cf. *bernardi* OWEN 1850
?U. Senonian. Rosenberg etc. (Prussia)

○

171. "*Plesiosaurus*" *balticus* SCHRÖDER 1885
?L. Senonian. Marienburg (Prussia)

! ○ △

Plesiosauria, fam., gen. et sp. indet.

172. Specimens described by PERSSON (1959,
pp. 460—461) ?L. Maestrichtian, Bjär-
num; L. Campanian, Ignaberga, Ivö
etc. (Scania)

○ △

U. and M. Jurassic

Pliosauridae, gen. et sp. indet.

173. *Peloneustes* sp. v. HUENE 1937 L. Ox-
fordian (?U. Callovian), "Ornaton-Ton."
Near Niegranden (Kurland)

!

European Russia

U. Cretaceous

Elasmosauridae

174. "*Elasmosaurus*" *helmerseni* (KIPRIJA-
NOFF 1882) Senonian. Maloje Serdoba
(the oblast of Saratov)

○ △

175. *Elasmosaurus orskensis* BOGOLUBOV
1911 Senonian. Konopljanka (the oblast
of Chkalov)

○

176. *Elasmosaurus?* *serdobensis* BOGOLUBOV
1911 Senonian. Maloje Serdoba (the
oblast of Saratov)

○

177. *Elasmosaurus?* *kurskensis* BOGOLUBOV
1911 ?Cenomanian. Possoskovo (the
oblast of Saratov)

○ △

Cimoliasauridae

178. *Scanisaurus nazarowi* (BOGOLUBOV
1911) Senonian. (The oblast of Chkalov)

○

Polycotylidae

179. *Polycotylus* cf. *latipinnis* COPE 1869 Se-
nonian. Maloje Serdoba (the oblast of
Saratov)

○

180. *Polycotylus orientalis* BOGOLUBOV 1911
Senonian. Konopljanka (the oblast of
Chkalov)

○ △

181. *Polycotylus ultimus* BOGOLUBOV 1911
Senonian. Maloje Serdoba (the oblast of
Saratov)

○

182. *Polycotylus brevispondylus* BOGOLUBOV
1911 ?Cenomanian. Locality unknown

○

183. *Polycotylus epigurgitis* BOGOLUBOV 1911
Cenomanian. Devitjy (the oblast of
Voronesj)

○

184. *Polycotylus ichthyospondylus* var. *tanaïs*
BOGOLUBOV 1911 Cenomanian. Devitjy
(the oblast of Voronesj)

○ △

185. *Polyptychodon interruptus* OWEN 1841
Cenomanian. (The oblast of Kursk)

!

Rhomaleosauridae

186. "*Plesiosaurus*" cf. *balticus* SCHRÖDER
1885 Senonian. Konopljanka (the oblast
of Chkalov)

○

187. "*Plesiosaurus*" cf. *bernardi* OWEN 1850
?Senonian. (The oblast of Saratov)

○

Plesiosauria, fam., gen. et sp. indet.

188. "*Cimoliasaurus*" sp. BOGOLUBOV 1911,
pp. 382—386 Senonian. Guberli (the
oblast of Chkalov)

○ △

189. "*Cimoliasaurus*" sp. BOGOLUBOV 1911,
pp. 386—387 ?Senonian. Konopljanka
(the oblast of Chkalov)

○

190. "*Plesiosaurus neocomiensis*" CAMPICHE 1860 ?Senonian. (The oblast of Saratov)
○

L. Cretaceous

Plesiosauria, fam., gen. et sp. indet.

191. "*Cimoliasaurus*" sp. BOGOLUBOV 1911, p. 379 ?Albian. Berezniki (the Moscow basin)
∧

192. "*Plesiosaurus*" *nordmanni* EICHWALD 1859 Neocomian. Biassala (Crimea)
∧

U. and M. Jurassic

Plesiosauridae

193. *Colymbosaurus*? cf. *brachistospodylus* HULKE 1870 Portlandian. Pljos (the oblast of Kostroma)
○

194. *Colymbosaurus sclerodirus* BOGOLUBOV 1911 Portlandian. Vorobjovy Gory (the Moscow basin)
○ ∧

195. *Colymbosaurus* sp. BOGOLUBOV 1911 Portlandian. Mnjovniki (the Moscow basin)
∧

196. *Colymbosaurus*? cf. *trochanterius* (OWEN 1840) Portlandian. Chukino (the Moscow basin)
○

197. *Muraenosaurus elasmosauroides* BOGOLUBOV 1911 Portlandian. (The Moscow basin)
○

198. *Muraenosaurus fahrenheitii* (WALDHEIM 1846) Portlandian. Chukino (the Moscow basin)
○

199. *Muraenosaurus purbecki* BOGOLUBOV 1911 Portlandian. Tartarovo (the Moscow basin)
○

200. *Muraenosaurus* sp. BOGOLUBOV 1911, pp. 239—241 Portlandian. (The Moscow basin)
○

201. *Muraenosaurus* sp. BOGOLUBOV 1911, pp. 262—264 Oxfordian or Callovian. (The oblast of Jaroslavl)
○

202. *Muraenosaurus leedsi* SEELEY 1874 Callovian. (The oblast of Riasan)
○

203. *Cryptocleidus simbirskensis* BOGOLUBOV 1909 Callovian. Goroditje (the oblast of Uljanovsk)
○ ∧

204. *Cryptocleidus*? sp. BOGOLUBOV 1911 Callovian? (The oblast of Vologda)
○

Pliosauridae

205. *Stretosaurus* cf. *macromerus* (PHILLIPS 1871) Portlandian? Mnjovniki (the Moscow basin)
! ○

206. *Pliosaurus brachyspondylus* (OWEN 1839) Kimmeridgian. Zhukino (the Moscow basin)
! ○

207. *Pliosaurus irgisensis* (NOVOZHILOV 1948) Kimmeridgian. Saveljevsk (the oblast of Saratov)
◄

208. *Pliosaurus rossicus* NOVOZHILOV 1948 Kimmeridgian. Boinsk (the Republic of Chuvaš)
◄

209. *Peloneustes philarchus* SEELEY 1869 Oxfordian. Near the river Unza (The oblast of Kostroma)
○ ∧

210. *Liopleurodon ferox* SAUVAGE 1873 Callovian. Rezhika etc. (The Moscow basin)
! ○

Rhomaleosauridae

211. *Simolestes vorax* ANDREWS 1909 Callovian. Rezhika (the Moscow basin)

/

Northern Asia

L. Jurassic and Triassic

Plesiosauridae

212. *Plesiosaurus?* *robustus* DAMES 1895 M. Lias. Urung-Tumus (N. Siberia)

○

Eastern Asia

U. Cretaceous

Elasmosauridae, gen. et sp. indet.

213. *Elasmosaurus?* *sachalinensis* RIABININ 1915 Senonian. (Sachalin)

∩

U. and M. Jurassic

Pliosauridae

214. *Pliosaurus* cf. *andrewsi* TARLO 1960. See TARLO (1960, pp. 163 and 180) Oxfordian. Weiyuan (S. China)

/

Pliosauridae, gen. et sp. indet.

215. *Sinopliosaurus weiyuanensis* YOUNG 1942 Oxfordian. Weiyuan (S. China)

/

Southern Asia

U. and M. Jurassic

Rhomaleosauridae

216. *Simolestes?* *indicus* LYDEKKER 1877 Umia Stage (Portlandian) Kach (India)

∩

South-western Asia

U. Cretaceous

Plesiosauria, fam., gen. et sp. indet.

217. Material described by HAAS 1958 Cenomanian. Ma'ayan, near Elath (Israel)

○

North-eastern Africa

U. Cretaceous

Polycotylidae, gen. et sp. indet.

218. "Plesiosaurier A.". STROMER 1935 Cenomanian. Baharije (Egypt)

△ ∩

219. "Plesiosaurier D". STROMER 1935 Cenomanian. Baharije (Egypt)

○

Plesiosauria, fam., gen. et sp. indet.

220. "Plesiosaurier B"; "Plesiosaurier C". STROMER 1935 Cenomanian. Baharije (Egypt)

○

Eastern Africa

U. and M. Jurassic

Rhomaleosauridae

221. *Simolestes nowackianus* v. HUENE 1938 Oxfordian. Harrar (Ethiopia)

△

Southern Africa

L. Cretaceous

Rhomaleosauridae

222. *Leptocleidus capensis* ANDREWS 1911 Neocomian, Uitenhage Beds. Picnic Bush (Cape of Good Hope)

△ ○ ∩

South-western Africa

U. Cretaceous

Cimoliasauridae, gen. et sp. indet.

223. Specimen under investigation by Dr. M. T. ANTUNES, of Lisbon Maestrichtian. The enclave of Cabinda, N. of the Congo River estuary

/ ○

North Western Africa

U. Cretaceous

Elasmosauridae, gen. et sp. indet.

224. "*Plesiosaurus*" *mauretanicus* ARAMBOURG 1952 Maestrichtian. Djebel Tilda etc. (Morocco)

/ ○

225. Undescribed specimens collected by Dr. L. GENTIL; in the National Museum of Natural History, Paris ?Turonian. Chichaona (Morocco)

○

The Arctic Region

L. Cretaceous

Plesiosauridae

226. "*Plesiosaurus*" *latispinus* OWEN 1854 Aptian. Lonely Island (in the Kara Sea)

○

U. and M. Jurassic

Plesiosauridae

227. *Cryptocleidus* (*Apractocleidus*?) *al-dingeri* v. HUENE 1935 L. Kimmeridgian. Milne Island (Greenland)

○ □ △

228. *Tricleidus svalbardensis* PERSSON 1962 ?Oxfordian. Near the Sassen Fiord (W. Spitzbergen)

○ □ △

Plesiosauridae, gen. et sp. indet.

229. Specimen described by WIMAN (1914, pp. 201—204) ?U. Jurassic. Mt. Janus (W. Spitzbergen)

○

230. Material described by PERSSON 1962 ?Portlandian. Near Cape Delta (W. Spitzbergen)

○ □ △

Pliosauridae

231. *Peloneustes* cf. *philarchus* SEELEY 1869 Oxfordian. Hooker Island (Franz Joseph Land)

○

L. Jurassic and Triassic

Plesiosauria, fam., gen. et sp. indet.

232. Specimen described by WIMAN (1916, pp. 223—226) ?U. Trias. Mt. Janus (W. Spitzbergen)

○

Central North America

U. Cretaceous

Elasmosauridae

233. *Leurospondylus ultimus* BROWN 1913 Edmonton Formation (Maestrichtian). Red Deer River, Alberta (Canada)

○ □ △

234. *Alzadasaurus pembertonii* WELLES and BUMP 1949 Sharon Springs member of the Pierre Shale (M. Campanian), near Iona (S. Dakota)

↗↖

235. *Elasmosaurus platyurus* COPE 1868 ?Basal Pierre Shale (M. Campanian). 15 miles NW of Fort Wallace (Kansas)

↗↖

236. *Hydralmosaurus serpentinus* (COPE 1877) Cretaceous no. 3 (?Niobrara Formation or Pierre Shale; see WELLES 1952, p. 61. Coniacian, Santonian or Campanian). "... in a bluff in Nebraska, on the southwest side of the Missouri, between Sioux City, Iowa, and Yanktown, Dakota".

○ □ △

237. *Alzadasaurus kansasensis* WELLES 1952 Niobrara Formation (Coniacian — Santonian). Wallace County (Kansas)

○ □ △

238. *Styxosaurus browni* WELLES 1952 Niobrara Formation (Coniacian — Santonian). Mule Creek, Edgemont (S. Dakota)

↗↖

239. *Styxosaurus snowi* (WILLISTON 1890) Niobrara Formation (Coniacian — Santonian). Hell Creek, Logan County (Kansas)

△ □ ○

240. *Thalassiosaurus ischiadicus* (WILLISTON 1903) Niobrara Formation (Coniacian — Santonian). Logan County (Kansas)

○ □ △

241. *Thalassonomosaurus marshi* (WILLISTON 1906) Niobrara Formation (Coniacian — Santonian). Logan County (Kansas)



242. *Ogmodirus martini* WILLISTON and MOODIE 1913 Fort Hays Limestone (basal Niobrara Formation; Coniacian) or possibly uppermost Benton Shale (Turonian). Cloud County (Kansas)



243. *Elasmosaurus morgani* WELLES 1949 U. Eagle Ford Shale (Turonian). Andy Anderson farm, near Cedar Hill, Dallas County (Texas)



244. *Thalassomedon haningtoni* WELLES 1943 Graneros Shale (U. Cenomanian — L. Turonian). Near Pritchett (Colorado)



245. *Alzadasaurus riggsi* WELLES 1943 Benton Shale (Cenomanian — Turonian). Near Alzada (Montana)



Elasmosauridae, gen. et sp. indet.

246. A specimen mentioned by WELLES (1952, p. 107; K.M.N.H No. 1302) Niobrara Formation (Coniacian—Santonian). (Kansas)



?Cimoliasauridae, gen. et sp. indet.

247. *Brimosaurus grandis* LEIDY 1854 ?U. Cretaceous. Near Greenville, Clark County (Arkansas)



Polycotylidae

248. *Polycotylus latipinnis* COPE 1869 U. Niobrara Formation (Santonian). Smoky River etc. (Kansas)



249. *Dolichorhynchops osborni* WILLISTON 1902 Niobrara Formation (Coniacian—Santonian). Logan County (Kansas)



250. *Polycotylus dolichopus* WILLISTON 1906 Niobrara Formation (Coniacian—Santonian). (Kansas)



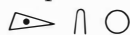
251. *Trinacromerum anonynum* WILLISTON 1903 U. Benton Shale (Turonian). Near Solomon (Kansas)



252. *Trinacromerum willistoni* RIGGS 1944 Greenhorn Limestone (U. Cenomanian — L. Turonian). Near Concordia (Kansas)



253. *Brachauchenius lucasi* WILLISTON 1903 Benton Shale (Cenomanian—Turonian). Delphos, Ottawa County (Kansas)



254. *Trinacromerum bentonianum* CRAGIN 1888 Benton Shale (Cenomanian—Turonian). Kansas.



255. *Trinacromerum kirki* RUSSEL 1935 Benton Shale (Cenomanian—Turonian). Assiniboine River, Manitoba (Canada)



Polycotylidae, gen. et sp. indet.

256. *Piptomerus hexagonus* COPE 1887 Fox Hills Formation, *fide* COPE (Maestrichtian). (New Mexico)



257. *Piptomerus megaloporus* COPE 1887 Fox Hills Formation, *fide* COPE (Maestrichtian). (New Mexico)



258. *Piptomerus microporus* COPE 1887 Fox Hills Formation, *fide* COPE (Maestrichtian). (New Mexico)



259. *Embaphias circulosus* COPE 1894 Pierre Shale (Campanian). Big Bend of Missouri (South Dakota)



260. "*Elasmosaurus*" *intermedius* COPE 1894 Pierre Shale (Campanian). Big Bend of Missouri (South Dakota)



261. "*Plesiosaurus*" *gulo* COPE 1872 Niobrara Formation (Coniacian—Santonian) or Pierre Shale (Campanian). (Kansas)

○

262. "*Elasmosaurus*" *sternbergi* WILLISTON 1906 M. Niobrara Formation (Coniacian). Gove County (Kansas)

○

263. *Trinacromerum latimanus* WILLISTON 1908 Haily Shale (Turonian). (Wyoming)

∧

264. *Piratosaurus plicatus* LEIDY 1865 U. Cretaceous. Red River, Selkirk Settlement, Manitoba (Canada)

└

Plesiosauria, fam., gen. et sp. indet.

265. *Orophosaurus pauciporus* COPE 1887 Fox Hills Formation, *vide* COPE (Maestrichtian). (New Mexico)

○

266. *Uronautes cetiformis* COPE 1876 Fox Hills Formation, *vide* COPE (Maestrichtian). Amell's Creek (Montana)

○ ∧

267. "*Plesiosaurus*" *vaccinulensis* HAY 1930 Judith River formation (U. Campanian). Upper Missouri region (Montana)

○

268. *Oligosimus grandaevus* LEIDY 1872 Horizon unknown (?U. Cretaceous). Henry's Fork of Green River (Wyoming)

○

L. Cretaceous

Elasmosauridae, gen. et sp. indet.

269. "*Plesiosaurus*" *mudgei* CRAGIN 1894 Fredericksburg Shale (Albian). Blue Cut Hill, Kiowa County (Kansas)

○

270. "*Plesiosaurus*" *gouldi* WILLISTON 1897 (*partim*; see WELLES 1952, p. 106) Comanche Series (U. Aptian—L. Albian). Upper Bluff and Sand Creek, near Ashland, Clark County (Kansas)

○

Polycotylidae, gen. et sp. indet.

271. "*Plesiosaurus*" *gouldi* WILLISTON 1897 (*partim*; see WELLES 1952, p. 116) Comanche Series (U. Aptian—L. Albian). Upper Bluff and Sand Creek, near Ashland, Clark County (Kansas)

○

U. and M. Jurassic

Plesiosauridae

272. *Muraenosaurus?* *reedi* MEHL 1912 "Jurassic" (?Oxfordian). (Wyoming)

○ ∏ ∧

273. "*Plesiosaurus*" *shirleyensis* KNIGHT 1900 "Shirley Stage"=U. Sundance Formation (Oxfordian). Albany County (Wyoming)

∧ ∣ ○ ∧

274. *Tricleidus?* *laramiensis* (KNIGHT 1900) "Shirley Stage"=U. Sundance Formation (Oxfordian). Freezout Hills (Wyoming)

○ ∧

Pliosauridae

275. *Megalneusaurus rex* KNIGHT 1898 "Commo Stage"=Morrison Formation (Kimmeridgian—L. Portlandian). Natrona County (Wyoming)

○ ∏ ∧

Plesiosauria, fam., gen. et sp. indet.

276. *Pantosaurus striatus* MARSH 1891 "Baptanodon Beds"=U. Sundance Formation (Oxfordian). (Wyoming)

○

Eastern North America

U. Cretaceous

Elasmosauridae, gen. et sp. indet.

277. "*Elasmosaurus*" *orientalis* COPE 1868 Navesink Marl (Maestrichtian). Swedesboro (New Jersey)

○

278. "*Plesiosaurus*" *brevifemur* COPE 1875 "Green Sand no. 5". (New Jersey)

○

279. "*Plesiosaurus*" DE KAY 1833 "U. Cretaceous". Navesink Hills (New Jersey)

○

Cimoliasauridae

280. *Cimoliasaurus magnus* LEIDY 1851 "Green Sand". Burlington County (New Jersey)

○

Polycotylidae, gen. et sp. indet.

281. *Taphrosaurus lockwoodi* (COPE 1870) "Clay no. 1". Near Matteawan. Monmouth County (New Jersey)

○

South-eastern North America

Cretaceous

Plesiosauria, fam., gen. et sp. indet.

282. *Discosaurus planior* LEIDY 1870 "Cretaceous". (Mississippi)

○

283. *Discosaurus vetustus* LEIDY 1851 "Cretaceous". (Alabama)

○

Southern North America

L. Cretaceous

Elasmosauridae, gen. et sp. indet.

284. "*Plesiosaurus*" *mexicanus* WIELAND 1910. See WELLES (1952, pp. 106—107) Neocomian. Near Tlaxiaco, Oaxaca (Mexico)

!

Western North America

U. Cretaceous

Elasmosauridae

285. *Aphrosaurus furlongi* WELLES 1943 Moreno Formation (U. Campanian—L. Maestrichtian). Panoche Hills (California)

○ □ △

286. *Fresnosaurus drescheri* WELLES 1943 Moreno Formation (U. Campanian—L. Maestrichtian). Panoche Hills (California)

□ △

287. *Hydrotherosaurus alexandrae* WELLES 1943 Moreno Formation (U. Campanian—L. Maestrichtian). Panoche Hills (California)

—

288. *Morenosaurus stocki* WELLES 1943 Moreno Formation (U. Campanian—L. Maestrichtian). Panoche Hills (California)

○ □ △

U. and M. Jurassic

Plesiosauria, fam., gen. et sp. indet.

289. "*Plesiosaurus*" *hesternus* WELLES 1943 Portlandian. San Luis, Obispo County (California)

○

Northern South America

U. Cretaceous

Elasmosauridae

290. *Alzadasaurus tropicus* COLBERT 1949 Cenomanian or Turonian. Altagrazia de Orituco, in the district of Monagas (Venezuela)

○ □ △

Eastern South America

Cretaceous

Plesiosauria, fam., gen. et sp. indet.

291. Specimens described by WOODWARD (1891, pp. 314—317) "Cretaceous". Bahia (Brazil)

△

Southern South America

U. Cretaceous

Elasmosauridae, gen. et sp. indet.

292. The major part of the material which DEECKE (1895, pp. 32—50) referred

to *Pliosaurus chilensis* Gervais in Gay 1848. See COLBERT (1949, pp. 17—19) Senonian. Quiriquina (Chile)



Cimoliasauridae

293. *Aristonectes parvidens* CABRERA 1941 Maestrichtian. Cañadón del Loro, Chubut (Argentina)



Cimoliasauridae, gen. et sp. indet.

294. *Cimoliasaurus* sp. DEECKE 1895 Senonian. Quiriquina (Chile)



?Polycotylidae, gen. et sp. indet.

295. "*Pliosaurus*" *chilensis* Gervais in Gay 1848. See COLBERT (1949, pp. 17—19) Senonian. San Vicente, near Concepcion (Chile)



?Rhomaleosauridae

296. "*Cimoliasaurus*" *andium* DEECKE 1895 Senonian. Quiriquina (Chile)



L. Jurassic and Triassic

Plesiosauria, fam., gen. et sp. indet.

297. *Pliosaurus neogaeus* BURMEISTER 1861 U. Lias. Juntas (Argentina)



Eastern and Southern Australia

L. Cretaceous

Elasmosauridae

298. *Woolungasaurus*? sp. PERSSON 1960 Albian. Neales River (S. Australia)



299. *Woolungasaurus* sp. PERSSON 1960 Albian. Richmond (Queensland)



300. *Woolungasaurus glendowerensis* PERSSON 1960 Aptian. Glendower Station, near Prairie (Queensland)



Elasmosauridae, gen. et sp. indet.

301. Specimen I. PERSSON 1960 (p. 18) Albian. Near the Upper Flinders River (Queensland)



302. Specimen II. PERSSON 1960 (pp. 18—19) Albian. Richmond (Queensland)



303. Specimen IV. PERSSON 1960 (p. 20) Albian. Dunluce Station, Hughenden (Queensland)



304. Specimen III. PERSSON 1960 (pp. 19—20) Aptian. Amby, near Roma (Queensland)



Cimoliasauridae

305. *Cimoliasaurus maccayi* ETHERIDGE 1904 Aptian, Roma Series. White Cliffs (New South Wales)



?Cimoliasauridae, gen. et sp. indet.

306. Specimen I. PERSSON 1960 (p. 10) Albian. Near the Upper Flinders River (Queensland)



307. Specimen II. PERSSON 1960 (p. 11) Albian. Hughenden (Queensland)



Polycotylidae

308. *Dolichorhynchops*? sp. PERSSON 1960 Aptian, Roma Series. White Cliffs (New South Wales)



Polycotylidae, gen. et sp. indet.

309. Specimen I. PERSSON 1960 (pp. 5—6) Aptian. Wetherby, near Richmond (Queensland)



310. Specimen II. PERSSON 1960 (p. 6) Aptian, Roma Series. White Cliffs (New South Wales)



5. Selective synonym list

Only specific synonyms are concerned. Valid names in spaced italics. The numerals in brackets refer to the tabular synopsis.

Cimoliasaurus australis OWEN 1862 [316] — *Cimoliasaurus crassicosatus* OWEN 1870, p. 53.

“*Cimoliasaurus*” *cantabrigiensis* LYDEKKER 1889 [9] — *Cimoliasaurus neocomiensis* OWEN 1861, p. 11 (*non* CAMPICHE 1860, p. 42).

“*Cimoliasaurus*” *hirzbergi* KUHN 1934 [145] — *Cimoliasaurus portlandicus* HIRZBERG 1924, p. 221 (*non* OWEN 1869, p. 8).

Cimoliasaurus planus (OWEN 1864) [4, 84] — *Plesiosaurus pachyomus* OWEN 1840, p. 74 (*partim*).

Colymbosaurus? *portlandicus* (OWEN 1869) [13, 94] — *Plesiosaurus winspitensis* SEELEY 1871, p. 181.

Colymbosaurus? *trochanterius* (OWEN 1840) [19, 96, 196] — ? *Plesiosaurus affinis* OWEN 1840, p. 86.

Cryptocleidus richardsoni (LYDEKKER 1889) [25] — *Plesiosaurus plicatus* MANSEL-PLEYDELL 1888, p. 40 (*non* PHILLIPS 1871, p. 373).

Dolichorhynchops? sp. PERSSON 1960, p. 18 [308] — *Cimoliasaurus leucoscopelus* ETHERIDGE 1897, p. 19.

Liopleurodon ferox SAUVAGE 1873 [36, 107, ?108, ?142, 143, 210] — *Pliosaurus giganteus* WAGNER 1852, p. 130 (*non* TRAUTSCHOLD 1860, p. 356); ? *Ischyrodon meriani* H. v. MEYER 1856, p. 414; *Pliosaurus giganteus* TRAUTSCHOLD 1860, p. 356 (*non* WAGNER 1852, p. 130); *Thaumatosauros mosquensis* KIPRIJANOFF 1883, p. 27 (See TARLO 1960, pp. 165, 176, 177).

Muraenosaurus plicatus (PHILLIPS 1871) [27, 100] (*non* MANSEL-PLEYDELL 1888, p. 40) — ? *Plesiosaurus intraplanus* PHILLIPS 1871, p. 374; ? *Plesiosaurus hexagonalis* PHILLIPS 1871, p. 375.

Muraenosaurus truncatus (LYDEKKER 1889 ex OWEN 1854) [20, 99] — *Plesiosaurus subdepressus* OWEN 1854, p. 63.

Peloneustes philarchus (SEELEY 1869) [38, 209, ?231] — *Pliosaurus evansi* SEELEY 1869, p. 116.

“*Plesiosaurus*” *bernardi* OWEN 1864 [10, ?150, ?187] — *Plesiosaurus pachyomus* OWEN 1840, p. 74 (*partim*); *Plesiosaurus ichthyospondylus* SEELEY 1869, p. 17.

Plesiosaurus dolichodeirus CONYBEARE 1824 [55, ?118, 149, ?150] — ? *Plesiosaurus cliduchus* SEELEY 1865 a, p. 356.

Plesiosaurus guilelmi imperatoris DAMES 1895 [147] — *Seeleyosaurus holzmadenensis* WHITE 1940, p. 461.

"*Plesiosaurus*" *hawkinsi* OWEN 1840 [73, 76] — ?*Plesiosaurus hexatarsostinus* HAWKINS 1834, p. 40; ?*Plesiosaurus pentatarsostinus* HAWKINS 1834, p. 40; *Plesiosaurus etheridgi* HUXLEY 1858, p. 158.

"*Plesiosaurus*" *macrocephalus* CONYBEARE 1824 [67, 72] — *Plesiosaurus brachycephalus* OWEN 1840, p. 62.

Plesiosaurus macromus OWEN 1840 [54] — *Plesiosaurus macrourus* STUTCHBURY 1846, p. 417 (*Error*).

"*Plesiosaurus*" *phillipsi* SAUVAGE 1879 [14, 95] — *Plesiosaurus carinatus* PHILLIPS 1871, p. 374 (*non* CUVIER 1829, p. 486).

Pliosaurus brachydeirus OWEN 1841 [33, 105] — ?*Plesiosaurus sterrodeirus* SEELEY 1869, p. 98; *Pliosaurus suprajurensis* SAUVAGE 1879, p. 435.

Pliosaurus brachyspondylus OWEN 1839 [34, 206] — *Spondylosaurus frearsi* FISCHER DE WALDHEIM 1845, p. 343; ?*Pliosaurus wosinskii* FISCHER DE WALDHEIM 1846, p. 105; *Pleiosaurus nitidus* PHILLIPS 1871, p. 360.

Simolestes vorax ANDREWS 1909 [47, 211] — *Thaumatosauros calloviensis* BOGOLUBOV 1912, p. 200.

Stretosaurus macromerus (PHILLIPS 1871) [35, 106, ?205] — *Pliosaurus grandis* OWEN 1869, p. 3 (see TARLO 1960, pp. 160 and 176—177); *Polyptychodon archiaci* DESLONGCHAMPS 1872, p. 30.

Cimoliasauridae, gen. et sp. indet. PERSSON 1960, p. 10 [306] — *Plesiosaurus Sutherlandi* MAC COY 1867, p. 356; *Cimoliasaurus sutherlandi* ETHERIDGE 1904, p. 312; *Pliosaurus sutherlandi* CHAPMAN 1914, p. 278.

Elasmosauridae, gen. et sp. indet., I. PERSSON 1960, p. 18 [301] — *Plesiosaurus macrospondylus* MAC COY 1867, p. 356; *Pliosaurus macrospondylus* CHAPMAN 1914, p. 278.

6. List of rejected species

The numerals in brackets refer to the numbers in the tabular synopsis.

Brimosaurus grandis LEIDY 1854 [247]
Cimoliasaurus leucoscopus ETHERIDGE 1897
 (see above, p. 41)
 "Cimoliasaurus" *hirzbergi* KUHN 1934 [145]
 — *lissaensis* FRITSCH 1905 [130]
 — *teplicensis* FRITSCH 1905 [131]
 — *vicinus* FRITSCH 1905 [132]
Colymbosaurus dutertrei SAUVAGE 1879
 [104]
Cryptocleidus kimmeridgensis HIRZBERG 1924
 [141]

Discosaurus planior LEIDY 1870 [282]
 — *vetustus* LEIDY 1851 [283]
Elasmosaurus constrictus (OWEN 1850) [1]
 — ? *sachalinensis* RIABININ 1915 [213]
 "Elasmosaurus" *intermedius* COPE 1894 [260]
 — *orientalis* COPE 1868 [277]
 — *sternbergi* WILLISTON 1906 [262]
Embaphias circulosus COPE 1894 [259]
Haematosaurus lanceolatus SAUVAGE 1874
 [114]
Hunosaurus fasseli FRITSCH 1905 [133]

- Iserosaurus litoralis* FRITSCH 1905 [134]
Mauisaurus latibrachialis HECTOR 1874 [318]
Oligosimus grandaevis LEIDY 1872 [268]
Orophosaurus pauciporus COPE 1887 [265]
Pantosaurus striatus MARSH 1891 [276]
Piptomerus hexagonus COPE 1887 [256]
Piptomerus megaloporus COPE 1887 [257]
— *microporus* COPE 1887 [258]
Piratosaurus plicatus LEIDY 1865 [264]
Plesiosaurus ? *coelospondylus* OWEN 1865 [78]
— ? *erraticus* PHILLIPS 1871 [79]
— *macrospendylus* MAC COY 1867 (see above, p. 41)
— *neogaeus* BURMEISTER 1861 [297]
— ? *platydeirus* OWEN 1854 (non SEELEY 1869) [58]
— ? *posidoniae* QUENSTEDT 1848 [160]
— ? *suevicus* QUENSTEDT 1858 [161]
— *sutherlandi* MAC COY 1867 (see above, p. 41)
“*Plesiosaurus*” *affinis* OWEN 1840 [48]
— (*Eretmosaurus*?) *bavaricus* DAMES 1895 [157]
— *brevifemur* COPE 1875 [278]
— *ellipsospondylus* PHILLIPS 1871 [21, 49, 103]
— *giganteus* CONYBEARE 1824 [41]
— *gouldi* WILLISTON 1897 [270, 271]
— *gulo* COPE 1872 [261]
— *gurgitis* PICTET & RENEVIER 1858 [137]
— *hesternus* WELLES 1943 [289]
— *holmesi* HECTOR 1874 [314]
— *hoodi* OWEN 1870 [315]
— *houzeaudi* DOLLO 1909 [80]
— *kanzleri* KOKEN 1905 [89]
— *latispinus* OWEN 1854 [91]
— *mackayi* HECTOR 1874 [319]
— *mauretanicus* ARAMBOURG 1952 [224]
— *mexicanus* WIELAND 1910 [284]
— *mudgei* CRAGIN 1894 [269]
— *neocomiensis* CAMPICHE 1860 [138, 190]
— *nordmanni* EICHWALD 1859 [192]
— *pachyomus* OWEN 1840 [92]
— *recentior* PARKINSON 1822 [42]
— *simplex* PHILLIPS 1871 [43]
— *smithi* OWEN 1882 [2]
— *traversi* HECTOR 1874 [320]
— *vaccinulensis* HAY 1930 [267]
Pliosaurus aequalis PHILLIPS 1871 [44]
— *planus* HULKE 1883 [45]
“*Pliosaurus*” *chilensis* GERVAIS in GAY 1848 [295]
Polycotylus tenuis HECTOR 1874 [317]
— *suprajurensis* SAUVAGE 1876 [111]
Sinopliosaurus weiyuanensis YOUNG 1942 [215]
Taphrosaurus lockwoodi (COPE 1870) [281]
Thaumatosauros oolithicus H. v. MEYER 1841 [144]
Trinacromerum latimanus WILLISTON 1908 [263]
Uronautes cetiformis COPE 1876 [266]

7. “Non-Plesiosaurians”

F. 2448; in the Queensland Museum, Brisbane (LONGMAN 1935, p. 239). — This is an Ichthyosaurian bone fragment (see PERS-SON 1960, p. 21).

Ischyrotherium antiquum LEIDY 1856. — See WELLES 1952, p. 119.

Nothosaurops occiduus LEIDY 1870. — See WELLES 1952, p. 120.

Plesiosaurus doedicomus OWEN 1840. — The type specimen (in Brit. Mus. Nat. Hist.; cat. no. R. 273) is a non-Plesiosaurian

bone fragment with a superficial resemblance to a Plesiosaurian propodial.

Pliosaurus phosphaticus STEFANO 1903. — This species is apparently based upon Crocodilian material.

Purranisaurus potens RUSCONI 1948. — ?Nothosaurian. See RUSCONI 1956.

Termatosaurus crocodilinus QUENSTEDT 1858. — According to BROWN (1894, p. 749) this species is based upon Ichthyosaurian teeth.

8. Index

The numerals in brackets refer to the numbers in the tabular synopsis.

The other numerals refer to the pages.

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9. Addendum

Recently the descriptions of the two Plesiosaurian species briefly dealt with below became available to the writer. Since the major part of the present paper was already set up, the species in question could not be mentioned in the tabular synopsis of the distribution of the Plesiosaurians (above, pp. 23—40).

1. *Elasmosaurus amalitskii* PRAVOSLAVLEV 1916. From the Upper Cretaceous of the Don district, S. Russia. Numerous vertebrae; girdle bones, limb bones. — The species is a large Elasmosaurid.

2. *Polyptychodon hudsoni* WELLES & SLAUGHTER 1963. From the Eagle Ford Shale (Turonian) near Dallas, Texas. Teeth, fragments of skull and mandible, and a vertebra "which may or may not belong to the same individual, or even species" (Welles & Slaughter 1963, p. 133). — The poorly-known genus *Polyptychodon* has usually been grouped with the Polycotylidae (ROMER 1953, p. 595; SAINT-SEINE in PIVETEAU 1955, p. 433; v. HUENE 1956, p. 409; and other authors). WELLES & SLAUGHTER. (1963, p. 131) referred *P. hudsoni* to the Pliosauridae. Until more is known about *Polyptychodon* it seems more appropriate to group this genus with the Polycotylidae, a family to which all other known U. Cretaceous brachydiran Plesiosaurians are referred.

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11. List of works arranged with regard to the regional distribution of the finds of Plesiosaurian remains

Works containing extensive descriptions, or revisions, or being otherwise of particular interest, are denoted with an asterisk.* — Some stratigraphical works which have been used for the correlation etc. of the find localities are denoted with a circle.°

Works of general character (manuals etc.) are not mentioned in the list.

Europe

The British Isles: ANDREWS 1895, 1896, 1897, 1909, 1910, 1910a*, 1913*, 1922, 1922a; ARKELL 1933°, 1956°; CARTE & BAILY 1863; CONYBEARE 1824; DEAN *et al.* 1961°; DELAIR 1959; HARKER & BARROW 1908°; HUDSON 1960°; HULKE 1870; HUXLEY 1858; LINDER 1913; LYDEKKER 1889a*; MANSEL-PLEYDELL 1888, 1889; MILLER 1858; OWEN 1840, 1840a, 1840—1845, 1850, 1851*, 1854, 1861, 1861a, 1861b, 1863, 1864*, 1865*, 1869*, 1878; PHILLIPS 1871; SEELEY 1865, 1865a, 1869, 1871, 1871a, 1874, 1874a, 1877, 1877a, 1892, 1893; SMELLIE 1915, 1918; SOLLAS 1881*; STUTCHBURY 1846; SWINTON 1930, 1930a, 1931, 1948; TARLO 1958a, 1959, 1959a, 1960*; TATE & BLAKE 1876; WATSON 1909, 1910, 1911, 1911a; WHITE 1940.

N. W. continental Europe: ARKELL 1956°; BARROIS 1875; BENEDEN 1880; BIGOT 1938; CORROY 1928; CUVIER 1924; DEAN *et al.* 1961°; DESLONGCHAMPS ?1872; DOLLO 1909; FOLLET 1949; HUENE & MAUBEUGE 1952; KOKEN 1905; LENNIER 1889; Lex. Stratigr. Int. 1, 4, 1956°; SAUVAGE 1873, 1876, 1879*, 1880*, 1882, 1883, 1888, 1910—1911*; TARLO 1960*; WEGNER 1914*.

S. W. Europe: SAUVAGE 1897—1898*, 1898a.

Central Europe: ARKELL 1956°; AUGUSTA & SOUKUP 1940*; BAYER 1897, 1916*; BRANDES 1914; DAMES 1895*; DEAN *et al.* 1961°; EDINGER 1935; FRAAS 1910*; FRITSCH & BAYER 1905; HUENE 1902, 1921, 1923*, 1929, 1934, 1935; KOKEN 1883; MEYER 1841, 1856, 1856a; QUENSTEDT 1852; REIFF 1935; REUSS 1856; SPEYER 1929; TARLO 1960*; WAGNER 1852.

The Baltic region: HUENE 1937; PERSSON 1954, 1959*, 1962; SCHRÖDER 1885.

European Russia: ARKELL 1956°; BOGOLUBOV 1909, 1911*, 1912; EICHWALD 1862, 1868; FISCHER DE WALDHEIM 1845, 1846; KIPRIJANOFF 1883*; NOVOZHILOV 1948; RIABININ 1909; ROZHDESTVENSKY 1947; TARLO 1960*; TRAUTSCHOLD 1860, 1862, 1876.

Asia

N. Asia: RIABININ 1939.

E. Asia: RIABININ 1915; TARLO 1960*; YOUNG 1942, 1946.

S. Asia: LYDEKKER 1889, 1889a.

S. W. Asia: HAAS 1958.

Africa

N. E. Africa: STROMER 1935.

E. Africa: HUENE 1938.

S. Africa: ANDREWS 1911.

N. W. Africa: ARAMBOURG 1952.

The Arctic Region

HUENE 1935; PERSSON 1962a*; RIABININ 1936, 1939; WIMAN 1914, 1916.

North America

COBBAN & REESIDE 1952°; COPE 1868, 1868a, 1870*, 1872, 1875, 1876, 1877, 1894; CRAGIN 1888, 1891; IMLAY 1944°, 1952°; KNIGHT 1898, 1900; LE CONTE 1868; LEIDY 1851, 1854, 1865, 1870, 1870a, 1870b; MEHL 1912; POPENOE *et al.* 1960°; RUSSEL 1935; STEPHENSON *et al.* 1942°; WELLES 1943*, 1949, 1952*, 1953; WELLES & BUMP 1949; WIELAND 1910; WILLISTON 1889, 1903, 1906, 1908; WILLISTON & MOODIE 1913, 1917; WILMARTH 1938°; WILSON *et al.* 1957°, 1959°.

South America

CABRERA 1941; COLBERT 1949*; DEECKE 1896; GERVAIS *in* GAY 1848; RUSCONI 1948, 1956; WOODWARD 1891.

Australia

CHAPMAN 1914; DAINTREE 1872; ETHERIDGE 1897*, 1904*; HOWCHIN 1928; LASERON 1954; Lex. Stratigr. Int. 6, 5a, b, e, 1958—1959°; LONGMAN 1924, 1930, 1935; MAC COY 1867; PERSSON 1960*; ROMER & LEWIS 1960; TEICHERT & MATHESON 1944; WHITE 1935.

New Zealand

HAAST 1870; HECTOR 1874*; Lex. Stratigr. Int. 6, 4, 1959°; OWEN 1862, 1870.

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