

PALEONTOLOGY.—*New genera and subgenera of Lower Cretaceous ammonites.*

RAYMOND CASEY,<sup>1</sup> Geological Survey of Great Britain. (Communicated by Alfred R. Loeblich, Jr.)

The genera and subgenera diagnosed and briefly discussed in this paper are of Aptian and Albian age and are based partly on new discoveries in south-east England and partly on a revision of some previously described American and European material. The work has arisen as a consequence of research on the Ammonoidea of the English Lower Greensand formation, of which a systematic account is in preparation. Advance publication is given to the present contribution in order that its substance may be available for inclusion in the forthcoming *Treatise on invertebrate paleontology*.

I am indebted to Dr. L. F. Spath, of the British Museum (Natural History), and R. V. Melville, of the Geological Survey of Great Britain for access to the collections in their charge, and to C. W. Wright, who has communicated to me for study specimens and casts received from the U. S. National Museum and the Geological Survey of Canada.

Family Hoplitidae Hyatt

Subfamily Cleoniceratinae Whitehouse

Genus *Cleoniceras* Parona and Bonarelli, 1896

*Neosaynella*, n. subg.

*Cleoniceras* in which the umbilical bullae have disappeared and in which the falciform or sigmoidal costae normal to the genus have degenerated into obscure *Oppelia*-like crescents on the outer half of the sides. Venter tabulate in the early stages of development. Suture-line as in *Cleoniceras* s.s.

*Type species*.—*Cleoniceras* (*Neosaynella*) *inornatum*, n. sp.

*Remarks*.—*Neosaynella* is a specialized development of the stock which gave rise to *Cleoniceras* s.s., and presumably is an expression of the same vital adjustments which led to the production of oxycones in other families. The subgenus is unique in the Hoplitidae in that it lacks both tubercles and true costae at all stages of growth,

features which it might be considered desirable to emphasize taxonomically by full generic separation from *Cleoniceras*. The two groups are, however, connected by passage forms. Stratigraphical and morphological sequence indicate that *Neosaynella* is a secondarily smooth endform and that the laevigate condition is not an original feature inherited from its desmoceratid ancestors.

*Occurrence*.—Southeast England; Transcaspiia. Lower Albian (*Douvilléiceras mammillatum* zone).

*Cleoniceras* (*Neosaynella*) *inornatum*,  
n. sp.

Fairly narrowly umbilicated platycone with strongly compressed, bluntly lancetiform whorl-section, widest at the umbilical border. Neanic whorls with a narrow, flat peripheral band which diminishes in width in the course of subsequent growth until the venter is acute. Umbilical wall subvertical, with angular rim. Radial line falciform. Outer crescents, with accompanying shallow depressions, about 18 per whorl, barely discernible before 30 mm diameter. Suture-line with asymmetric principal lobe and numerous auxiliary saddles, apparently similar to that of *C. cleon* (d'Orbigny).

*Dimensions of holotype*.—As follows:

Diameter (in mm).....	51 (wholly septate)
Whorl-height (as per cent of diameter)....	55
Whorl-thickness (as per cent of diameter)...	23
Umbilicus (as per cent of diameter).....	16

*Remarks*.—*C. (N.) inornatum* has a close analogue in *C. (N.) platidorsatum* (Sinzow) from the Mangyshlak Peninsula of Transcaspiia. The Russian form (in which the originals of Sinzow, 1909, pl. ii, figs. 1–2, are here included) differs in its anguliradiate radial line and its wider, shallower first lateral lobe. Sinzow's species is dated by its association with *Sonneratia dutempleana* (d'Orbigny) and *Inoceramus salamoni* d'Orbigny, both being species of the *D. mammillatum* zone. The subgenus is also represented by other undescribed species in the English Lower Albian.

*Occurrence*.—Lower Greensand (top of Folkestone beds; *D. mammillatum* zone), Folkestone, south-east England. Holotype (Geological Sur-

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vey of Great Britain<sup>2</sup> no. 70409) and paratype (G.S.G.B. no. 74131), collected by the author.

Anadesmoceras, n. gen.

Moderately involute, discoidal Cleoniceratinae with distinct umbilical rim and flattened whorl-sides. Venter narrowly arched or sharpened in the adolescent, widening toward the aperture, which is preceded by wide sigmoidal constrictions. Indications of umbilical nodes and sigmoidal ribs on the inner whorls only. Test with striae of growth united into more or less distinct bundles, most prominent on the inner lateral area. Suture-line as in *Cleoniceras*.

Type species.—*Anadesmoceras strangulatum*, n. gen., n. sp.

Remarks.—This genus, like *Farnhamia*, described below, is a curiously localised development of the English Lower Albian. It is represented by a number of new species and has been referred to on a previous occasion (Casey, 1951: 98) as a link between the hoplitid *Cleoniceras* and the family Desmoceratidae. The constricted body-chamber and virtual smoothness give a desmoceratid aspect, but its affinities lie with the associated *Cleoniceras baylei* (Jacob) and *C. subbaylei* Spath. The latter has a similar striate test and in the course of growth shows the same changes in whorl shape, but is more distinctly ribbed and lacks the terminal constrictions. *Uhligella*, another link with the Desmoceratidae, has ribbing and constrictions of a different type and is not ventrally sharpened.

Occurrence.—Lower Greensand (Folkestone beds), Farnham area of Surrey, south-east England. Lower Albian (*Leymeriella tardefurcata* zone).

Anadesmoceras strangulatum, n. gen., n. sp.

Whorl-section very compressed, the sides very gently convex and convergent, subparallel at the aperture. Venter narrowly arched in the adolescent, becoming subacute on the posterior part of the body-chamber and then broadening rapidly towards the peristome. Umbilicus with flat, steeply sloped wall and distinct but blunt rim. Neanic whorls with about 10 very faint radially elongated nodes, directed obliquely forwards from the umbilical rim, each corresponding to three or four sigmoidal subcostae, barely visible except on the upper lateral area. Body-chamber, half a whorl in length, smooth except for growth

striae and two or three sigmoidal, ventrally widening constrictions.

Dimensions.—As follows:

	Holotype*	Paratype 1 (body-chamber)	Paratype 2 (septate)
Diameter (in mm.).....	71	75	46
Whorl-height (as per cent of diameter).....	52	49	52
Whorl-thickness (as per cent of diameter).....	25	26	27
Umbilicus (as per cent of diameter).....	17	17	17

\* Maximum diameter c. 80 mm.; septate to c. 45 mm.

Occurrence.—Lower Greensand (Folkestone beds; top of *L. tardefurcata* zone), Wreccelesham, near Farnham, Surrey, southeast England. Holotype (G.S.G.B. no. Zm 1283), Paratype 1 (G.S.G.B. no. Zm 1281), Paratype 2 (G.S.G.B. no. Zm 1290), collected by the author.

Farnhamia, n. gen.

More or less evolute, compressed. Whorl-section subrectangular, the flattened sides converging to a broadly convex venter. Umbilicus with high, smooth, subvertical wall but no definite rim. Early whorls strongly costate, at first resembling a bluntly ribbed *Sonneratia* or *Tetrahoplites*, with the ribs arising in twos and threes from umbilical bullae and continuing across the venter with a forward sinuation. Costation, if persistent, tending to break up into long, untuberculated primaries and short intercalated secondaries, recalling that of *Parahoplites*. Outer whorls smooth or with only a few radial folds on the lower part of the flank. Suture line with subquadrate, more or less symmetrical, trifid first lateral lobe; saddles bifid, aborescent, progressively slender-stemmed and declining regularly toward the umbilicus.

Type species.—*Farnhamia farnhamensis*, n. gen., n. sp.

Remarks.—*Farnhamia* is the earliest known representative of the cleoniceratine branch which contains *Sonneratia*, *Tetrahoplites*, *Pseudosonneratia*, and *Protohoplites* and which lies in the direct line of ancestry of the Hoplitinae. Its discovery is thus of interest for the light it throws on the origin and interrelations of the primitive members of the Hoplitidae, and although as yet known only from a restricted area in southeast England, is likely to play an important part in European Albian chronology. Its appearance at the base of the *Leymeriella*

<sup>2</sup> Hereinafter abbreviated to G.S.G.B.



*tardefurcata* zone, along with *Anadesmoceras*, coincides with the incoming in North Germany of *Proleymeriella*, the first of the Leymeriellinae, another important branch of the Lower Albian Hoplitidae. This brings out the merit of Breistroffer's zonal classification, in which this burst of evolutionary activity is dated as the commencement of Albian time (Breistroffer, 1947).

*Farnhamia* was derived, probably, from *Uhligella*, and like that genus shows considerable variation in the duration of the costate stage. The innermost whorls are almost indistinguishable from *Sonneratia*, but the whorl-shape soon changes to that of *Tetrahoplites*. In that genus, however, the umbilical bullae are retained to a larger diameter, and the ribbing is sharper, persistent, and never modifies to a parahoplitid style. Adult specimens of *Farnhamia* attain an average diameter of about 300 mm, and detached portions of outer whorls may be strikingly similar to certain Upper Aptian *Parahoplites*. But generic discrimination may be readily made if the sutures are preserved, the breaking up of the umbilical lobe into numerous auxiliary elements being the chief diagnostic feature of the *Farnhamia* suture line as compared with that of *Parahoplites*.

Records of "*Parahoplites*" and "Desmocerate ammonites" from the "*jacobi* subzone" of the Farnham district (Wright and Wright, 1942) refer to *Farnhamia*. The accompanying "*Acanthohoplites*" and "? *Beudanticeras*" are here identified as *Hypacanthoplites* (including *H. trivialis* Breistroffer, group) and *Anadesmoceras*. Several folio plates would be required to illustrate the various species of *Farnhamia* now in the collections.

**Occurrence.**—Lower Greensand (Folkestone beds; 80–90 feet below the Gault), Farnham area

of Surrey, south-east England. Lower Albian (base of *L. tardefurcata* zone).

**Farnhamia farnhamensis**, n. gen., n. sp.  
Figs. 1, 4–9.

At diameter of 15 mm whorl-section but little compressed, sides convex, venter broadly rounded; arcuate ribs arise mostly in pairs, sometimes in threes, from obtuse umbilical bullae and traverse the venter as an obtuse-angled chevron with rounded apex directed forward. Whorls later increase in relative height and flatten at the sides; ribs slightly sigmoidal, without definite bullae, blunt on the test, sharper on the internal mold. Maximum vigour of costation attained at 45–55 mm. diameter, after which ribs fade from the middle of the sides, the umbilical portion remaining as thick, radially elongated folds or bulges, the ventral portion as heavy folds, separated by interspaces equal to their width. Umbilical and ventral ribs in proportion of about 12 to 24 at 70 mm. diameter. Ribbing lost at about 120 mm. diameter. Outer whorls smooth and more convex in section.

**Dimensions.**—As follows:

	Holotype* (near beginning of body- chamber)	Holotype (penulti- mate whorl)	Paratype 1† (septate)
Diameter (in mm.).....	228	155	60
Whorl-height (as per cent of diameter).....	?	43	42
Whorl-thickness (as per cent of diameter).....	?	34	?
Umbilicus (as per cent of diameter).....	28	?	22

\* Maximum diameter 250 mm.; septate to c. 200 mm.  
† Crushed laterally.

**Remarks.**—In *Farnhamia farnhamensis* the ribbing is lost before the onset of the "*Parahoplites*" stage. The costate nucleus thus re-

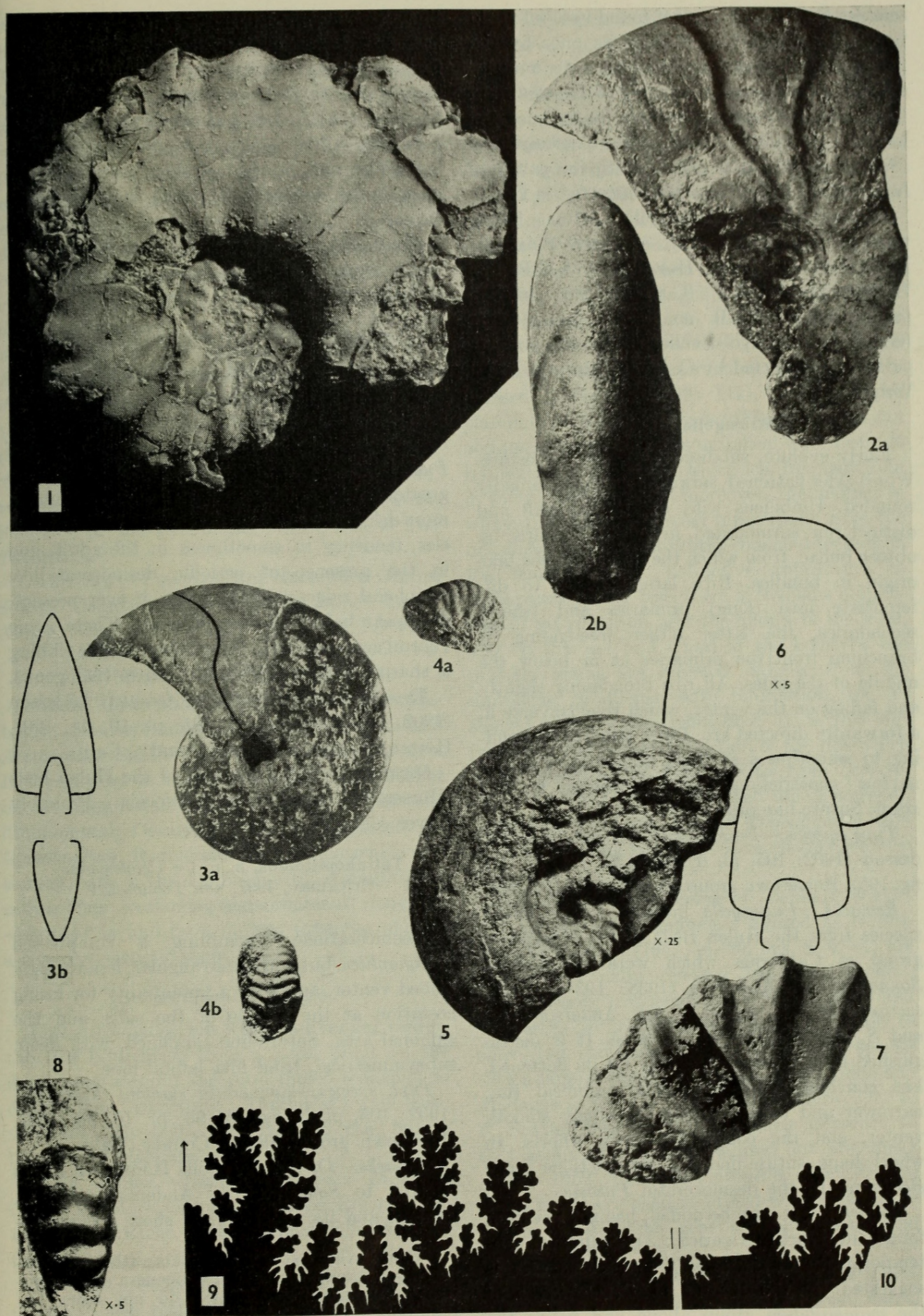
FIGS. 1, 4–9.—*Farnhamia farnhamensis*, n. gen., n. sp.: 1, Side view of paratype 1 (G.S.G.B. no. 85850) ×1; 4, side view (a) and ventral view (b) of paratype 2 (G.S.G.B. no. 85848) ×1; 5, side view of holotype (G.S.G.B. no. 74128) showing smooth outer whorl, ×0.25; 6, diagrammatic whorl-section ×.5; 7, side view of paratype 4 (C.W. and E.V. Wright Coll.) (internal mold) ×1; 8, ventral view of inner whorl of holotype (G.S.G.B. no. 74128) ×0.5; 9, external suture line of paratype 3 (G.S.G.B. no. 85849) ×1. Lower Greensand (Folkestone beds; base of *L. tardefurcata* zone), Coxbridge pit, Alton Road, west of Farnham, Surrey, southeast England.

FIG. 2.—*Anadesmoceras strangulatum*, n. gen., n. sp., side view (a) and ventral view (b) of holotype (G.S.G.B. no. Zm 1283), ×1. Lower Greensand (Folkestone beds; top of *L. tardefurcata* zone), Wreclesham, near Farnham, Surrey, southeast England.

FIG. 3.—*Cleoniceras (Neosaynella) inornatum*, n. sp., side view (a) and diagrammatic whorl-section (b) of holotype (G.S.G.B. no. 70409), ×1. Lower Greensand (Folkestone beds; *D. mammillatum* zone), Folkestone, Kent, southeast England.

FIG. 10.—*Farnhamia* sp., internal suture line (incomplete) of near adult specimen (G.S.G.B. no. 74134) ×1. Locality and horizon as for Figs. 1, 4–9. Originals of all figures (except fig. 7) collected by the author.





FIGS. 1-10.—(See opposite page for legend).



sembles *Tetrahoplites*, and if found isolated could be distinguished from that genus only by the passage of the umbilical bullae into radially elongated bulges and the fading of the ribs from the middle of the sides. Compare, for instance, the lateral aspect of *Tetrahoplites sexangulatus* (Sinow) (1907, pl. iii, fig. 4) with the paratype fragment of *F. farnhamensis* illustrated in Fig. 7.

**Occurrence.**—Coxbridge pit, Alton Road, west of Farnham, Surrey, southeast England. Horizon as for genus. Holotype (G.S.G.B. no. 74128), paratype 1 (G.S.G.B. no. 85850), paratype 2 (G.S.G.B. no. 85848), paratype 3 (G.S.G.B. no. 85849), collected by the author; paratype 4 collected by C. W. Wright and E. V. Wright.

***Puzosigella*, n. gen.**

Fairly evolute, subdiscoidal, strongly costate. Whorl-sides flattened, subparallel. Venter broadly rounded. Umbilicus with subvertical wall and distinct rim, surmounted, in the early whorls, by obtuse bullae, from which the sigmoidal ribs take origin in bundles. Ribs later tending to differentiate into (long) primaries and (short) secondaries, the latter either free-ending or branching from the primaries at or below the middle of the sides. All ribs broadening slightly and fading on the venter, which they traverse in a forwardly directed arc. Inner lateral area tending to smoothness at large diameters. Periodic narrow constrictions, not persistent to the adult. Suture line puzosoid.

**Type species.**—*Pachydiscus sacramenticus* Anderson (1902: 105, pl. 6, figs. 133, 134; pl. 10, fig. 195), Horsetown group, Shasta County, Calif.

**Remarks.**—*Puzosigella* includes the following species from the Hulen Beds of the Horsetown group of California which were assigned to *Sonneratia* by Anderson (1938: 193–197): *P. sacramenticus*, *S. mulleri*, *S. taffi*, Anderson spp., and *S. rogersi* Hall and Ambrose. It is distinguished from *Sonneratia* chiefly by its flattened, less convergent sides, distinct umbilical rim, narrower and closer ribbing, relatively smooth venter, and the constricted early whorls. In whorl-shape, suture-line, and constrictions *Puzosigella* recalls the desmoceratid *Puzosia*.

*Sonneratia*, it may be added, has not yet been found in North America. Approximate contemporaneity of *Puzosigella* and *Sonneratia* is suggested by the records of *Douvilléceras* of the *mammillatum* group above and below the horizon of *Puzosigella* (Anderson, 1938: 67–69),

though the earlier occurrence of *Douvilléceras* has not been illustrated and requires confirmation. The Texan and Colombian forms identified with *Sonneratia* and *Pseudosonneratia* by Scott (1937, 1940) and considered to indicate a Middle Albian age, are Upper Aptian Parahoplitidae and, so far as they are generically recognisable, belong to *Kasanskyella* and *Colombiceras*.

**Occurrence.**—LeConte and Perrin zones of the Hulen beds (Horsetown group) of California. Probably upper Lower Albian.

***Leconteites* (Breistroffer, 1952), n. gen.**

This genus, proposed by Breistroffer<sup>3</sup> (1952: 266) without diagnosis and therefore hitherto invalid, comprises the Californian "*Cleonicer*" of Anderson (1938). It occurs with early forms of *Puzosigella* and differs from that genus in its greater involution and compression, finer ribbing, more delicate and less persistent umbilical tubercles, tendency to smoothness in the adult, and in the presence of periodic desmoceratidlike peripheral ridges. Constrictions, if ever present, disappear before the neanic stage. There is no ventral acuteness as in *Cleonicer* and the ribbing is sharper and more elegant than in that genus.

**Type species.**—*Desmoceras lecontei* Anderson (1902: 95, pl. 3, figs. 94, 95; pl. 10, fig. 190), Horsetown group, Shasta County, Calif.

**Occurrence.**—LeConte zone of the Hulen beds (Horsetown group) of California. Probably Lower Albian.

***Tetrahoplitoides*, n. n. (= *Coloboceras*  
Crickmay, 1927, non Trouessart  
1889)**

Cleoniceratinae resembling a compressed *Tetrahoplites*, but with more angular, less strongly ribbed venter, and with a potentiality for losing costation at the middle of the sides and the siphonal area. Suture-line simplified, with deep, subsymmetrical, trifid first lateral lobe.

**Type species.**—*Sonneratia stantoni* Anderson, (1902: 105, pl. 3, figs. 91–93; pl. 10, fig. 108), Horsetown group, Shasta County, Calif.

**Remarks.**—Of the numerous Horsetown forms referred to *Sonneratia* by Anderson, only *S. stantoni* and its ally *S. crossi* show a close ap-

<sup>3</sup> During the past few years this author has proposed numerous genera and subgenera of ammonites under conditions which do not meet the requirements of the International Rules of Zoological Nomenclature, often with citation of type species only.



proach to the Cleoniceratinae of the Eastern Hemisphere. Comparison is suggested with the Transcasian group of *Tetrahoplites orientalis* Casey (e.g. Sinzow, 1907, pl. iii, figs. 9, 10, 18) and it is interesting to note that loss of ribbing as in *T. crossi* (Anderson) can be matched in species of *Farnhamia*, a forerunner of *Tetrahoplites*. There is also resemblance to the boreal genus *Gastrolites*, but in that genus the umbilical terminations of the ribs are not distinctly bullate as in *Tetrahoplitoides*. Moreover, the ontogenetic changes in the venter of *Gastrolites*—from smooth to an ornament of thick bar-like ribs—is the opposite of that of *T. stantoni*. In that species the ribs are continuous across the venter already at 15 mm. diameter and progressively weaken on the siphonal area as growth proceeds, so that finally they are in high relief only on the ventrolateral angles.<sup>4</sup> The wide, asymmetric principal lobe and pseudoceratitic tendency of the *Gastrolites* suture line is also distinctive.

**Occurrence.**—Upper part of Horsetown Group, Shasta County, Calif. Probably upper Lower Albian.

#### Subfamily Gastrolitinae Wright

Besides *Gastrolites* and *Neogastrolites* McLearn, this subfamily is here taken to include *Archthoplites* Spath and *Subarchthoplites*, n. gen. It is regarded as an independent boreal offshoot of the Hoplitidae whose connection with the fundamental Desmoceratidae is suggested by *Cymahoplites*. It diverged from the normal evolutionary path of the Hoplitidae by strengthening rather than weakening the ornament along the siphonal line, and by acquiring tubercles only at a late phylogenetic stage.

#### Subarchthoplites, n. gen.

Like *Archthoplites*, but with more convex venter, the ribs bifurcating from a lower point on the flanks and without the pronounced tendency to cupid's-bow curvature. Umbilical wall subvertical, fairly high, with rounded rim. Suture line as in *Archthoplites*.

**Type species.**—*Lemuroceras belli* McLearn (1945: 10, pl. iii, figs 17–18), Loon River formation, Loon River, Buffalo Head Hill, Alberta, Canada.

**Remarks.**—*Subarchthoplites* is a welcome addition to our scanty knowledge of the boreal

Albian ammonite fauna. It is important because it is linked, on the one hand, with *Archthoplites* and, on the other, with *Cymahoplites*, a desmoceratid derivative known as yet only by its type species, *Ammonites kerenskianus* Bogoslovsky, from the Albian of Central Russia. McLearn's original determination of *S. belli* as *Archthoplites* ? (see Spath, 1942: 688) was justified, and it is unfortunate that he and his compatriots subsequently followed Spath (1942: 688) in assigning this species and certain of its associates to *Lemuroceras*. This latter genus has been described otherwise only from India and Madagascar and its record from the Arctic Province, though unknown from the intervening areas, rightly puzzled Collignon (1949: 117). It is a more planulate form than *Subarchthoplites*, with an oblique, generally rimless umbilical wall. Definite bifurcation of the ribs is much less frequent than in the Canadian genus; moreover, the manner in which the ribs issue almost tangentially from the umbilicus and then abruptly change direction on the flank gives a distinctive appearance to *Lemuroceras*. In *S. belli* there is frequent bifurcation of the ribs from near the middle of the sides, and on the last half whorl of the holotype the primary stems are directed radially from the umbilicus, producing, with bifurcation, the Y-shaped pattern of *Archthoplites*. It is this difference in the umbilical portion of the ribs which chiefly distinguishes *Cymahoplites* from *Lemuroceras*. These two genera are closely allied, however, and some approach to the *Cymahoplites* condition of ribbing is seen in *Lemuroceras besairiei* Collignon.

McLearn's "*Lemuroceras* cf. *indicum* Spath" and certain other fragments figured as *Gastrolites* by Warren (1947, pl. 29, figs. 8, 9, 11) are here provisionally referred to *Subarchthoplites*. "*Lemuroceras*" *macconnelli* (Whiteaves) and "*L.* *irene* McLearn are at present impossible to place, but comparison of casts of these species with a large series of *Lemuroceras* from India and Madagascar (kindly made available by Dr. L. F. Spath) does not support their reference to that genus. It has been pointed out previously (Casey 1952) that the European and Eurasian forms that have been identified with *Archthoplites* belong to different genera (*Tetrahoplites* and *Protohoplites*).

In Greenland and Central Russia *Archthoplites* is part of a Lower or basal Middle Albian faunal assemblage (Nikitin, 1888: 171–6; Spath 1946: 9), as also is *Cymahoplites* (Bogoslovsky, 1902:

<sup>4</sup> These ventrolateral portions of the ribs were described as bullae by Crickmay (1927: 511).



129). It may be surmised, therefore, that *Subarthroplites* is of about the same date. This is supported by its occurrence below the *Gastrolites* horizon (McLearn, 1945), the position of the *Gastrolites* fauna in the European zonal scheme having been fixed by the fortunate discovery of that genus in the topmost Middle Albian of Folkestone, south-east England (Casey, 1936: 448; Spath 1937).

*Occurrence*.—Western interior of Canada. Probably Lower or basal Middle Albian.

Subfamily Hoplitinae s.s.

Genus *Hoplites* Neumayr, 1875

The author supports the application of Wright (1951) to the International Commission on Zoological Nomenclature for use of its plenary powers to preserve the name *Hoplites*, Neumayr, 1875, for the genus of ammonites typified by *Ammonites dentatus* J. Sowerby. It is a polyphyletic genus, derived in part from *Pseudosonneratia* and in part from *Otohoplites*.

*Isohoplites*, n. subgen.

Like *Pseudosonneratia*, but with a ventral depression which attenuates or effaces the ribs along the siphonal line.

*Type species*.—*Parahoplites steinmanni* Jacob (1907: 312) (= *Ammonites interruptus* Pictet and Campriche, *pars* (1860, pl. xxviii, figs. 7–8 only), Albian, Sainte Croix, Switzerland).

*Remarks*.—*Isohoplites* lies on the border-line of the Cleoniceratinae and the Hoplitinae, being morphologically intermediate between *Pseudosonneratia* and *Hoplites* of the *dentatus* group. In the latter genus not only does the ventral depression or channel clearly separate the ribs, but the free ends of the ribs alternate on opposite sides of the venter and tend to become tuberculated. On a summation of morphological characters *I. steinmanni* is thus closer to *Pseudosonneratia*, but since the appearance of a ventral depression is taken as diagnostic of the Hoplitinae the subgenus is assigned to *Hoplites*.

Attention was called to the presence in the English Gault of this transitional group of hoplitids when some species were recorded as "Cf. *Pseudosonneratia laffrayei* Breistroffer" (Casey, 1950: 293). It is now known to be represented by a number of undescribed species of wide distribution in the basal Middle Albian of southeast England, where it is restricted to a narrow band immediately below the *Hoplites*

*benettianus* subzone of the *Hoplites dentatus* zone and above the horizon of *Pseudosonneratia* (*Douvilléiceras mammillatum* zone). It is thus a subgenus of stratigraphical utility.

*Occurrence*.—Southeast England, France, Switzerland. Middle Albian (base of *H. dentatus* zone).

Family Desmocerotidae Zittel

*Brewericeras*, n. gen.

Discoidal, moderately involute Desmocerotidae resembling *Beudanticeras*, but with very flat, subparallel whorl-sides, consistently sharp umbilical rim, and no constrictions or peripheral ridges. Costate developments with falciform ribs on the upper lateral area that are sharper and more regular than those of *Beudanticeras* and which weaken on the ventral area.

*Type species*.—*Ammonites breweri* Gabb (1869: 130, pl. 20, fig. 5; pl. 19, fig. 5b), Horsetown group, Shasta County, Calif.

*Remarks*.—*Ammonites breweri* Gabb and its allies have been generally included in *Beudanticeras* or *Desmoceras*. The general aspect is that of a *Beudanticeras*, but in the costate forms of that genus (e.g. *B. dupinianum* d'Orbigny sp., *B. subparandieri* Spath) the ribs are as pronounced on the venter as on the sides, and the constrictions and accompanying ridges give an irregularity to the ornament which is quite distinct from that of *Brewericeras*. But whereas the costate species of *Beudanticeras* and *Brewericeras* are easily separable, the two genera produce smooth homoeomorphs (e.g. *Brewericeras haydeni* Gabb sp., *Br. hulenense* Anderson sp., and *Beudanticeras laevigatum* J. de C. Sowerby sp.). The whorl-section of the European *Beudanticeras*, however, is never so slab-sided as that of *Brewericeras*, and a sharp umbilical rim, while occasionally developed (as in *Beudanticeras sanctae-crucis* Bonarelli and Nagera), is not typical.

*Occurrence*.—North America. Lower and/or Middle Albian.

*Zürcherella*, n. gen.

Costate desmocerotids differing from *Uhligella* in their finer, puzosid ribbing, which tends to effacement around the umbilicus.

*Type species*.—*Desmoceras zürcheri* Jacob (in Jacob and Tobler, 1906; 9–10, pl. ii, figs. 1–3), Upper Aptian, Luitere Zug, Switzerland.

*Remarks*.—This typically Upper Aptian genus



(examples *D. zürcheri* Jacob, *D. stremmei* Zwierzycki, *Uhligella subzürcheri* Renngarten) is taken to embrace the Upper Barremian-Aptian group of *Desmoceras sequenzae* (Coquand) Sayn. Its separation from Jacob's comprehensive *Uhligella* was advocated in 1949 (Casey 1949: 338). A somewhat similar type of lateral ribbing is produced in the more inflated *Valdedorsella*.

**Occurrence.**—North-west Europe, Russia, North and East Africa, South America. Upper Barremian-Upper Aptian.

#### Family Cheloniceratidae Spath

#### Genus *Chelonicer* Hyatt, 1903

Notwithstanding the somewhat unusual circumstances of its introduction (Stanton, in Hyatt, 1903: 101, footnote), the genus *Chelonicer*, with authorship credited to Hyatt and with *Ammonites royerianus* d'Orbigny as type species, has been universally accepted by ammonite specialists. Nomenclatorial stability of the genus is threatened, however, by inability to assess satisfactorily the taxonomic characters of its type species.

D'Orbigny's holograph of *Ammonites royerianus* illustrates an immature ammonite from the Aptian of Bailly-aux-Forges, Wassy (Haute-Marne), France, which is stated (d'Orbigny, 1841: 365-366) to be 12 mm. in diameter and to be represented in natural size. As noted by Stoyanow (1949: 104), however, the illustration is of 20 mm diameter. In any case, the specimen is too small for positive determination below family level. Kilian (1913: 340) referred it to the same group as *A. ricordeanus* d'Orbigny (now assigned to the genus *Megatyloceras* Humphrey), while Rodighiero (1922: 63, 67, 69) even supposed it to belong to *Astiericeras*. On the other hand, Nikchitch (1915: 3, 4, 13, 50) asserted that *A. royerianus* is merely the young of *A. cornuelianus* d'Orbigny, the type of which was obtained from the same area and from the same stratigraphical horizon. Efforts to trace the original specimen (or specimens) on which *A. royerianus* was based have been unsuccessful, and in view of the similarities in the nuclei of species of *Chelonicer*, *Epicheloniceras* n. subgen., *Megatyloceras* and *Roloboceras* n. gen., its identification with *Ammonites cornuelianus* cannot be considered beyond doubt.

It is clear that so long as *Ammonites royerianus* d'Orbigny remains the type species of *Chelonicer*, the nomenclature of that genus and of the

family Cheloniceratidae in general rests on an insecure basis. In order to remove this insecurity and to validate existing nomenclatorial practice, the author, in conjunction with C. W. Wright, has applied to the International Commission on Zoological Nomenclature to use its plenary powers to set aside all previous type designations for the genus *Chelonicer* and to designate *Ammonites cornuelianus* d'Orbigny to be type species of that genus.

The interpretation of *Chelonicer* s.s. here adopted complies with the acceptance of *A. cornuelianus* d'Orbigny as the type species. This is a laterally bi-tuberculate form whose flat venter is angulated at the margins but does not bear tubercles.

#### *Epicheloniceras*, n. subg.

*Chelonicer* in which the primary ribs (and occasionally the secondary ribs) are attenuated or depressed along the middle of the venter and are elevated into tubercles at the ventro-lateral angles. At large diameters whorls rounded and with close, untuberculated ribs, as in *Chelonicer* s.s. of similar growth stage.

**Type species.**—*Douvilléiceras tschernyschewi* Sinzow (1906: 182-186, pl. ii, figs. 11, a, b, c, (lectotype), 12; pl. iii, figs. 2-7), Upper Aptian, Kysil-Kaspak (Kislowodsk), Russia.

**Remarks.**— This subgenus, corresponding broadly to the "group of *Douvilléiceras martini*" of authors, had an almost world-wide distribution in Upper Aptian times. *Ch. orientale* (Jacob), *Ch. tschernyschewi* (Sinzow), *Ch. subnodoscostatum* (Sinzow), *Ch. caucasicum* (Anthula), and *Ch. stoliczkanum* (Gabb) are some of the more familiar species. Unfortunately d'Orbigny's *Ammonites martini* (d'Orbigny, 1841, pl. 48, figs. 7-10), though widely quoted, is unsuitable as type species since it has a confused taxonomic history and cannot be correctly interpreted from the idealised and inadequate protographs.

*Epicheloniceras* was derived directly from *Chelonicer* s.s. of the Lower Aptian by differentiation of the ventral ribbing. Records of species of *Epicheloniceras* in the Lower Aptian (e.g. Kilian, 1915: 62-63; Roch, 1927: 21-22) are based on misidentifications.

The type species of *Epicheloniceras* has been fully studied by Nikchitch (1915: 25-37, Russian text).

**Occurrence.**—Northwest Europe, Russia,



Africa, South America, Mexico, California. Upper Aptian.

**Roloboceras**, n. gen.

Cheloniceratidae with depressed, semicircular whorl-section and thick, blunt ribs which pass over the venter without modification and which tend to unite at the umbilical border in obtuse nodes or bulges. Irregularly ribbed and constricted juvenile stage often prolonged. Umbilical wall high, subvertical and smooth. Suture line simplified, with massive external saddle, low lateral saddles and very narrow lateral lobes.

*Type species*.—*Ammonites hambrovi* Forbes (1845: 354, pl. xiii, fig. 4), Lower Greensand (Lower Aptian), Atherfield, Isle of Wight.

*Remarks*.—In whorl-shape and tuberculation (recalling certain Turonian Vascoceratidae) *A. hambrovi* and its allies stand apart from other Cheloniceratidae and the group clearly requires generic separation. The genus *Megatyloceras* was founded by Humphrey (1949: 149) to include forms previously referred to the "group of *Douvilleiceras hambrovi* (Forbes)", but with *Douvilleiceras coronatum* Rouchadzé as type. As interpreted by its type species, *Megatyloceras* must be restricted to those species which show exaggerated lateral tubercles placed at the middle of the side, giving a coronate whorl-section. Of the species listed by Humphrey, *Megatyloceras* thus embraces only *D. coronatum* Rouchadzé, *Megatyloceras georgiense*, n. n.,<sup>5</sup> and, probably, the miniature *Ammonites ricordeanus* d'Orbigny.

*Roloboceras* includes *A. hambrovi* Forbes, *Cheloniceratidae hambrovi* var. *horrida* Spath, *Ch. perli* Spath, and a number of undescribed species in the English Lower Greensand.

*Occurrence*.—Northwest Europe. Lower Aptian (*Deshayesites deshayesi* zone).

Family Parahoplitidae Spath

Subfamily Acanthohoplitinae Stoyanow

**Gargasiceratidae**, n. gen.

More or less evolute Acanthohoplitinae. Whorl-sides and venter flattened; umbilical and ventral margins rounded. Ribs straight or slightly flexed, attenuated on the sides, tending to broaden and become flat-topped on the

<sup>5</sup> = *Douvilleiceras coronatum* Rouchadzé, 1938 (:178-179, pl. i, fig. 7; pl. ii, fig. 1). Differs from *D. coronatum* Rouchadzé, 1933 (:195-197, pl. iii, fig. 4) in the persistence of the lateral tubercle.

venter. Primary ribs on the inner whorls periodically emphasized or forming thin lateral flanges which are limited ventrad by the line of involution. Secondary ribs intercalated or branching from the top of a primary flange, the point of bifurcation marked by a minute tubercle. Ribbing later becoming more uniform, without tubercles, flanges or bifurcation. Neanic whorls with a narrow depression along the siphonal line. Suture line as in *Colombiceras*.

*Type species*.—*Ammonites gargasensis* d'Orbigny (1841: 199-200, pl. 59, figs. 5-7), Upper Aptian (Gargasian), Gargas (Vaucluse), France.

*Remarks*.—Species of *Gargasiceratidae*, appearing already in the Lower Gargasian ("martini zone"), have been assigned usually to the genus *Acanthohoplites* Sinzow, but the *aschiltaensis* group of Anthula, to which Sinzow's genus must be restricted, is of later horizon and comprises less evolute forms with rounder whorls, no ventral depression and a different style of ribbing. The affinities of *Gargasiceratidae* lie wholly with the contemporaneous *Colombiceras*. In that genus, however, the propensity for flat-topped ribbing extends to the whorl-sides, and the ventral groove and lateral flanges of the young *Gargasiceratidae* are not present. As in the Acanthohoplitinae generally, the tuberculate stage is transient and may be terminated very early in ontogeny (e.g. *Gargasiceratidae interiectum* Riedel sp.).

In addition to the type species, the following forms of *Gargasiceratidae* have been noted: *G. aptiense* (Roch), *G. recticostatum* (Kilian) Roch sp., *G. attenuatum* (Kilian) Roch sp. (Roch, 1926, sub *Acanthohoplites*), *G. acutecostum* (Riedel), *G. interiectum* (Riedel) and *G. pulcher* (Riedel) (Riedel, 1937, sub *Acanthohoplites*).

*Occurrence*.—Southeast France, South America, Mexico.

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