JOURNAL OF PALEONTOLOGY, VOL. 30, NO. 5, P. 1179–1186, PL. 127, 128, SEPTEMBER 1956



# JURASSIC MOLLUSCA FROM PERU

L. R. COX
Department of Geology, British Museum (Natural History)

ABSTRACT—The paper describes five species of Gastropoda (four new: *Ampullella peruviana, Cossmannea nascaensis, C. peruviana, Nerinella caballensis*) and nine of Pelecypoda (one new: *Cercomya peruviana*) collected by Dr. W. Rüegg at two localities near the coast in the Nasca area of Peru. It is concluded that the "Río Grande formation" (of Rüegg) from which they came is of Bajocian age, as previously suggested by fragmentary ammonites.

## INTRODUCTION

THIS paper deals with a series of gastropods and pelecypods collected by Dr. W. Rüegg at two localities near the coast in the Nasca area of Peru (latitude about 15° S). Dr. Rüegg's account of the geology of the area is at present in course of publication in the Geologische Rundschau. One locality is situated 4 km. upstream from Santa Ana at the mouth of the Río Grande, and the other about 1.4 km. E by S of Puerto Caballa, 7 km. NW of Santa Ana. The fossiliferous rock at both localities is a pink calcareous deposit belonging to a predominantly volcanic series which Dr. Rüegg proposes to term the "Río Grande formation." This formation was included by Steinmann (1929, p. 81) in his "Andine Diabas-Melaphyrformation," which some previous workers had called the "Porphyritic Formation." Dr. Rüegg has kindly presented the fossils described to the Department of Geology of the British Museum (Natural History), the registration numbers cited being those of the Department in question.

## GEOLOGICAL AGE OF THE FOSSILS DESCRIBED

The occurrence of a few fossils submitted to specialists in other groups had already led to the provisional conclusion that the fossiliferous deposits are of Bajocian or Bathonian age. Fragmentary ammonites from the Río Grande locality had been submitted to Dr. W. J. Arkell, who identified some as *Planammatoceras* aff. *P. planinsigne* (Vacek) and thought that others probably belonged to the same species as specimens from Chile which Möricke (1894, p. 16, pl. 4, fig. 11) had recorded as *Hammatoceras alleoni* Dum., and Jaworski (1926, p. 224) had considered referable to *H. semilunatum* Janensch. These determinations, which, however, needed confirmation by better material, suggested that the beds represent the *opalinum* or the *scissum* Zone of the lower Bajocian. Both localities yielded fossil corals determined by Dr. J. W. Wells as *Astrocoenia* aff. *A. hyatti* Wells, *A. hyatti* itself being a species from the Sundance formation of Wyoming, indicated by Imlay (1952) to be Callovian-Oxfordian in age. Corals from a third locality where the Río Grande formation is exposed (Tres Palos-Mal Paso, 33.5 km. NNE of Puerto Caballa) were identified as *Calamophyllia* aff. *C. radiata* (Lamouroux) and *Astrocoenia* cf. *A. hyatti* Wells, *C. radiata* being a species of the European Bathonian.

The gastropods and pelecypods here described have been identified as follows:

Gastropoda

*Bathrotomaria* sp.
*Ampullella peruviana*, n. sp.
*Cossmannea nascaensis*, n. sp.
*Cossmannea peruviana*, n. sp.
*Nerinella caballensis*, n. sp.

Pelecypoda

*Entolium demissum* (Phillips)
*Lima* (*Plagiostoma*) cf. *L.* (*P.*) *alticosta* Chapuis & Dewalque
*Ctenostreon pectiniforme* (Schlotheim)
*Trigonia stelzneri* Gottsche
*Lucina* cf. *L. bellona* d'Orbigny
*Lucina goliath* Gottsche
*Pleuromya uniformis* (J. Sowerby)
*Cercomya undulata* (J. de C. Sowerby)
*Cercomya peruviana*, n. sp.

This list includes only six forms which have been identified definitely with species described previously. Four of these (*Entolium demissum, Ctenostreon pectiniforme, Pleuromya uniformis*, and *Cercomya un-*

*dulata*) are species found also in Europe, where they have a long geological range, starting in the case of the *Entolium* in the Toarcian and in the other three cases in the Bajocian, and extending in all cases to the Oxfordian or higher. Their presence, therefore, merely shows that the beds are of Middle or Upper Jurassic age. The other two (*Trigonia stelzneri* and *Lucina goliath*) are species which have so far been recorded only from South America, where they appear to be characteristic of the Bajocian, a record of *T. stelzneri* from the Callovian being based, most probably, upon a misidentification.

Of the species described as new, two appear to be particularly close to forms known from North America. These are *Nerinella caballensis*, which is very similar to *N. maudensis* (Whiteaves), originally described from beds in British Columbia which probably belong to the Bajocian, and *Cercomya peruviana*, which is comparable, on the other hand, with a Callovian species, *C. punctata* Stanton. The most notable new species is *Ampullella peruviana*, which most closely resembles certain European species of uppermost Jurassic (Portlandian) age. It is thus clear that such resemblances between species of long-ranging genera afford evidence which is too conflicting to be of help in deciding upon the exact geological age of the formation. Qualified identifications, such as that of *Lima* (*Plagiostoma*) cf. *L.* (*P.*) *alticosta*, are also of little use for this purpose. The evidence of the gastropods and pelecypods as to the exact stage of the Jurassic represented by the Río Grande formation is thus somewhat meagre, but the presence of the two species *Trigonia stelzneri* and *Lucina goliath* supports the provisional conclusion from the fragmentary ammonites that the age is Bajocian.

The Río Grande formation may thus be added to the known occurrences of Bajocian-Bathonian rocks in Peru, of which those previously known (as summarized by Steinmann, 1929, p. 75–80) are as follows:

Hacienda de Chunumayo, Dep. Huancavelica. Liassic and Bajocian fossils described by Jaworski (1915); several species figured by Steinmann (1929).

Hacienda Yanauctuto, Hacienda Ila, and Santa Barbara, Dep. Huancavelica. A few Bajocian ammonites are reported by Jaworski (1914, p. 305, 312) and Steinmann from these localities.

Sumbay and Lagunillas, between Arequipa and Puno, in area west of Lake Titicaca. A few ill-preserved silicified fossils, including *Nerinea*, possibly of Bajocian-Bathonian age, are reported by Jaworski (1914, p. 305) and Douglas (1920, p. 29, 31) from these localities.

## DESCRIPTION OF THE FOSSILS

### Class GASTROPODA
### Family PLEUROTOMARIIDAE
### Genus BATHROTOMARIA Cox, 1956
### BATHROTOMARIA sp.
### Pl. 127, fig. 1

*Material.*—One broken specimen (G. 71533).

*Description.*—This specimen, which consists apparently of the earlier whorls which have been broken away from the rest of the shell, is conical in shape and about 34 mm. high and 30 mm. in diameter. There is no umbilicus. The whorls have an obtuse, rounded-off median angulation of about 150°, separating a steep, flattened ramp

---

EXPLANATION OF PLATE 127

Illustrations are of natural size unless enlargement is stated. Localities are given in text. Registration numbers are those of the Geological Department of the British Museum (Natural History).

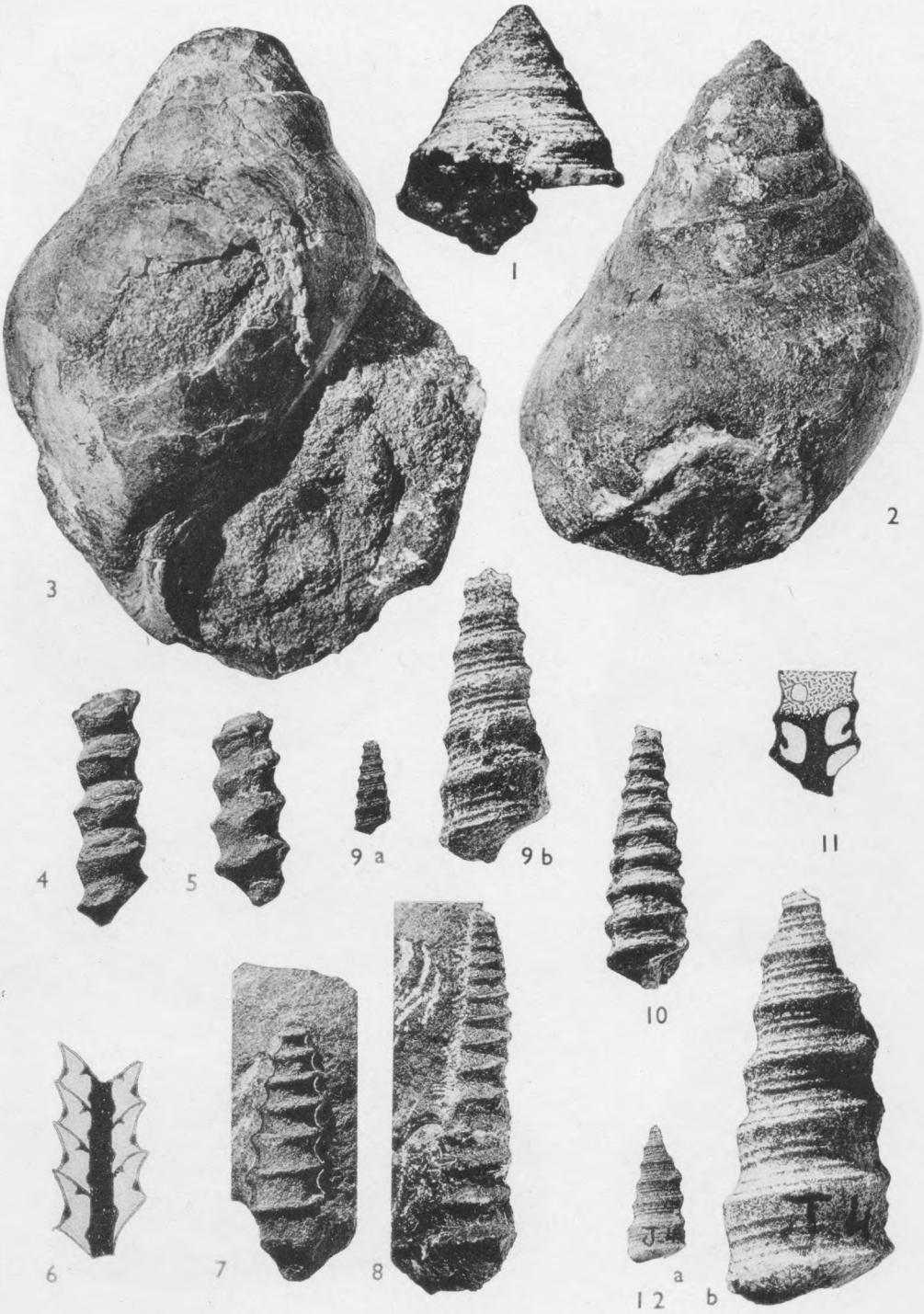
FIG. 1—*Bathrotomaria* sp. G.71533.

*2,3*—*Ampullella peruviana*, n. sp. *2*, Holotype G.71534; *3*, paratype, G.71535.

*4–6*—*Cossmannea nascaensis*, n. sp. *4*, Holotype, G.71543; *5,6*, paratypes, G.71544, G.71545, axial section of the last represented diagrammatically (×1.5).

*7,8*—*Cossmannea peruviana*, n. sp. *7*, Holotype, G.71515; *8*, paratype, G.71517.

*9–12*—*Nerinella caballensis*, n. sp. *9a,b*, paratype, G.71524 (*b*, ×3); *10*, paratype, G.71525 (×2); *11*, paratype, G.71526, axial section of later whorls (×2); *12a,b*, holotype G.71523 (*b*, ×3).


1
2
3
4
5
9 a
9 b
11
10
6
7
8
12 a
b

1

2

3

4

5

7

6

8

from a very slightly concave side which is inclined slightly towards the axis in an adapical direction. The side bears three and the ramp two depressed, rounded, subequal cords. On the last preserved whorl the side is limited adapically by a rounded carina, forming the margin of the base. This carina is partly visible on the preceding whorl, bordering the suture. The selenizone evidently coincided with the median angulation of the whorls. The growth lines are not clearly visible owing to the eroded condition of the specimen.

This specimen is a typical representative of the genus *Bathrotomaria*, but appears to belong to a new species. In most of the comparable European Jurassic species, such as *B. textilis* (Eudes-Deslongchamps), of the Bajocian, there are more numerous and finer spiral threads.

*Locality.*—One km. E by S of Puerto Caballa.

Family AMPULLOSPIRIDAE
Genus AMPULLELLA Cox, 1931
AMPULLELLA PERUVIANA, n. sp.
Pl. 127, fig. 2,3

*Material.*—The holotype (G. 71534), one figured paratype (G. 71535) and two less complete paratypes (G. 71536–7). Also three smaller specimens which probably consist of the early whorls of the species.

*Description.*—Large, anomphalous, almost biconical, height considerably exceeding diameter. Whorls more or less adpressed at suture, the earlier ones low and feebly convex, forming a slightly cyrtoconoid top to spire, with an apical angle of about 90°; later whorls increasing in relative height owing to a steepening of the sutural slope and becoming strongly concave in outline through the presence of a broad spiral depression which appears at about the origin of the penultimate whorl, slightly above the middle of its height, and continues to the outer lip. Last whorl broadly rounded at the periphery, and with its base flattened-convex in outline as far as the spirally ascending angulation which lies to the left of the inner lip. Aperture pyriform, its height exceeding that of the spire. Outer lip and growth lines strongly prosocline, slightly sigmoidal. Inductura relatively thin, not spreading over base, its edge almost in alignment with margin of columellar lip. Shell wall thick.

*Measurements.*—Holotype: height (apertural margin restored) ca. 80 mm., diameter 58 mm. Largest paratype: height (apex restored) ca. 100 mm., diameter 65.5 mm.

*Remarks.*—The most closely comparable described species are from the Upper Jurassic of Europe. In the English Portlandian species, *Ampullella elegans* (J. de C. Sowerby) (1836, p. 347, pl. 33, fig. 3), the proportions of the shell are about the same, but the whorls have a narrow sutural ledge and lack the well-defined spiral depression which appears on the later ones in the new species. The French Portlandian species, *A. beaugrandi* (de Loriol) (1874, p. 344, pl. 8, fig. 22*a*,*b*), has a broader spiral depression which produces almost an angularity of the periphery of the last whorl, and the height of its spire slightly exceeds that of the aperture.

*Locality.*—One km. E by S of Puerto Caballa.

Family NERINEIDAE
Genus COSSMANNEA Pchelintsev, 1927
COSSMANNEA NASCAENSIS, n. sp.
Pl. 127, fig. 4–6

*Material.*—The holotype (G. 71543) and five paratypes (G. 71541–2, 44–6).

*Description.*—Of medium size, very acute,

EXPLANATION OF PLATE 128

Illustrations are of natural size. Localities are given in text. Registration numbers are those of the Geological Department of the British Museum (Natural History).

FIG. *1*—*Lima* (*Plagiostoma*) cf. *L.* (*P.*) *alticosta* Chapuis & Dewalque. L.88533.
*2*—*Lucina* cf. *L. bellona* d'Orbigny. L.88539.
*3*—*Pleuromya uniformis* J. Sowerby L.88551.
*4*—*Lucina goliath* Gottsche. L.88553.
*5,6*—*Trigonia stelzneri* Gottsche. L.88540, L.88541.
*7*—*Cercomya peruviana*, n. sp. Holotype, L.88543.
*8*—*Cercomya undulata* (J. de C. Sowerby). L.88542.

anomphalous. Whorls strongly concave, with a bulging sutural region; their height is only slightly less than their diameter. Surface smooth. Three internal folds present, of which the columellar is prominent, angular, and at about one-third of whorl height, the parietal angular and slightly less prominent, and the labral prominent but bluntly rounded.

*Measurements.*—The maximum diameter is about 10 mm. The specimens all lack the apical whorls and their original height is difficult to estimate accurately.

*Remarks.*—The generic name *Cossmannea* (type *Nerinea desvoidyi* d'Orbigny) is here employed for the group of species with strongly concave whorls, a bulging sutural region, and 2–3 internal folds, considered by Cossmann (1898) to constitute *Nerinea* s.s. I have shown elsewhere (Cox, 1949) that a species of another group should be accepted as type species of *Nerinea*. Some highly acute species like the one now described have been referred to *Nerinella* Sharpe, but that genus is best restricted to forms in which the later whorls are not strongly concave and the ornament resembles that of the Turritellidae. Of European Jurassic species, "*Nerinea*" *contorta* Buvignier (Cossmann, 1898, p. 50, pl. 7, fig. 12,13), from the Rauracian, most closely resembles the species now described, but has whorls which are slightly higher in proportion to their diameter.

*Locality.*—Four km. upstream from mouth of Río Grande.

### COSSMANNEA PERUVIANA, n. sp.
Pl. 127, fig. 7,8

*Material.*—The holotype (G. 71515) and five paratypes (G. 71516–20), all incomplete.

*Description.*—Of medium size and moderate acuteness, anomphalous. Whorls relatively low, their height about one-half of their maximum diameter, strongly concave, with the sutural region forming a narrow, angular bulge, on the adapical side of the most projecting part of which the suture itself, which is obscure, appears to lie. Erosion produces a jagged edge to this angular bulge. A prominent, rounded labral fold is present, but in the specimen sectioned axially as the most promising for the purpose other internal features proved to be obscure.

*Measurements.*—Original height of largest specimen ca. 58 mm., maximum diameter ca. 12 mm.

*Remarks.*—The narrowness and pronounced angularity of the bulging sutural region are the distinctive features of this species. The most closely comparable European species is "*Nerinea*" *carinata* Piette (Cossmann, 1898, p. 27, pl. 2, fig. 29–31), from the upper Bathonian of France, which appears to be slightly less acute. "*N.*" *carinata*, like the Peruvian species, has a prominent labral fold; according to Cossmann its columella has only an oblique swelling and its parietal fold is almost invisible.

*Locality.*—Four km. upstream from mouth of Río Grande.

### Genus NERINELLA Sharpe, 1850
### NERINELLA CABALLENSIS, n. sp.
Pl. 127, fig. 9–12

*Material.*—The holotype (G. 71523) and seven paratypes (G. 71524–30).

*Description.*—Small, moderately acute, anomphalous. Whorls concave, relatively low, their diameter equal to about twice their height, carrying usually three, occasionally four, spiral threads on their concave region. One prominent, rather narrow labral fold, median in position; no columellar or parietal fold observable in a specimen sectioned (its internal structure is, however, partly obscured by calcite of secondary origin).

*Measurements.*—Original maximum height ca. 35 mm., maximum diameter 8 mm.

*Remarks.*—A closely related species is *Nerinella maudensis* (Whiteaves) (1884, p. 214, pl. 27, fig. 2, 2*a–d*), from the eastern end of Maude Island, British Columbia, where it probably came from the Bajocian Lower Yakoun formation.[1] *N. maudensis*, like the Peruvian species, has only one internal fold, on the outer wall. It appears, from the figures, to differ in its slightly higher whorls and more numerous spiral threads.

*Locality.*—1.4 km. E by S of Puerto Caballa.

[1] See McLearn, 1949, p. 16, for an incomplete list of fossils from this formation, including ammonites which, according to Whiteaves (1884, p. 255), were from the same beds as *N. maudensis*. McLearn does not mention the *Nerinella*.

Class PELECYPODA
Family PECTINIDAE
Genus ENTOLIUM Meek, 1865
ENTOLIUM DEMISSUM (Phillips)

*Pectin demissus* PHILLIPS, 1829, Geol. Yorkshire, vol. 1, p. 140, pl. 6, fig. 5.; PHILIPPI, R. A., 1899, Fósiles secundarios de Chile, p. 35, pl. 20, fig. 3.
*Pectin (Entolium) disciformis* Schübler, BURCKHARDT, 1900, Mus. La Plata Anales (Sec. Geol. Min.), vol. 2, p. 24, pl. 19, fig. 11; p. 32, pl. 21, fig. 2.; WEAVER, 1931, Univ. Washington Mem. 1, p. 273, pl. 28, fig. 170.

*Material.*—Four imperfect specimens.

*Remarks.*—This well-known species has been recorded previously, often under the synonymous name *Entolium disciforme* (Zieten), from a number of localities in the Cordillera of Argentina and Chile. In South America it usually occurs in beds assigned to the Bajocian, but it has also been recorded from the upper Lias of Argentina. In Europe its range extends from the upper Lias to the Oxfordian.

*Locality.*—Four km. upstream from mouth of the Río Grande.

Family LIMIDAE
Genus LIMA Cuvier, 1798
Subgenus PLAGIOSTOMA J. Sowerby, 1814
LIMA (PLAGIOSTOMA) cf. L. (P.) ALTICOSTA Chapuis & Dewalque
Pl. 128, fig. 1

[cf.] *Lima alticosta* CHAPUIS & DEWALQUE, 1853, Acad. roy. Belgique Mém. cour. vol. 25, p. 203, pl. 28, fig. 3*a-c*.
[cf.] *Lima (Plagiostoma) alticosta* Chap. & Dew., COX, 1943, Malac. Soc. London Proc., vol. 25, p. 168, pl. 18, fig. 46–48.

*Material.*—Two specimens (L 88533–4).

*Description.*—In the better preserved of the specimens, both of which are imperfect and somewhat distorted, the length exceeds the height, the umbonal angle is obtuse (about 120°), and the shell is not markedly inequilateral, the anterior umbonal ridge being short and not well defined and the ventral margin symmetrical and strongly convex. There are over 40 narrow ribs, separated by slightly unequal, flat interspaces of considerably greater width. The ribs are slightly sinuous and have sides which converge to some extent from their base to their rounded top, and their height is usually rather less than their basal width, although it is difficult to say to what extent it has been reduced by erosion. The ribs extend on to the posterior auricle. The height of the larger specimen is about 67 mm.

*Remarks.*—The comparatively equilateral outline of these specimens and the lack of any pronounced oblique elongation of the shell in an antero-ventral direction suggests comparison with the English Inferior Oolite species, *Lima alticosta*, and the slightly less equilateral *"Plagiostoma sulcatum gingense"* of Quenstedt (1856, p. 380, pl. 51, fig. 2), which I (Cox, 1943) have placed in its synonymy, although Dechaseaux (1936, p. 37, pl. 3, fig. 5) has regarded it as specifically distinct. As its name indicates, *L. alticosta*, in its most typical form, is characterized by high, square-cut ribs, but among specimens in the British Museum (Natural History) which appear to be referable to this species are some (Cox, 1943, pl, 18, fig. 46) in which the ribs are lower and more round-topped than in the more typical specimens. Erosion, either during life or after, may have produced this effect. The slight sinuosity of the ribs is one of the features of *L. alticosta*. In English Inferior Oolite specimens which appear referable to the species the number of ribs ranges from 26 to 67. Dechaseaux gives the number as 42–46, which is approximately the same as in the specimens now described. The presence of ribs on the posterior auricle, apparent in one of these specimens, contrasts, however, with the smoothness of this auricle in the typical *L. alticosta*, so that identification with that species must be qualified.

*Locality.*—Four km. upstream from mouth of Río Grande.

Genus CTENOSTREON Eichwald, 1862
CTENOSTREON PECTINIFORME (Schlotheim)

*Ostracites pectiniformis* SCHLOTHEIM, 1820, Petrefactenkunde, p. 231.
*Lima rustica* HUPPÉ, 1854, *in* Gay, Historia Chile, Zool., vol. 8, p. 295, pl. 4, fig. 6 (non Young & Bird, 1828).
*Ctenostreon Wrighti* Bayle, STEINMANN, 1929, Geologie von Perú, pp. 76, 78, text-fig. 89.

*Material.*—Four specimens.

*Remarks.*—These specimens, which have 11–12 ribs, agree well with the one from the Inferior Oolite of Peru figured by Steinmann as *Ctenostreon wrighti* Bayle, under which name Jaworski had already recorded specimens from the Dogger of Argentina. *C. wrighti* was founded by Bayle on a specimen

from the Inferior Oolite of Leckhampton, near Cheltenham, England, and has been regarded by British authors as a synonym of *C. pectiniforme*, which was originally described from the Inferior Oolite of Germany. *C. pectiniforme* itself has been recorded by several authors from the Dogger of Argentina and Chile, and there is little doubt that Huppé's *Lima rustica*, from Chile, should be included in its synonymy.

*Locality.*—Four km. upstream from mouth of Río Grande.

Family TRIGONIIDAE
Genus TRIGONIA Bruguière, 1789
TRIGONIA STELZNERI Gottsche
Pl. 128, fig. 5,6

*Trigonia Stelzneri* GOTTSCHE, 1878, Palaeontographica, Supp. 3, Lief. 2, Abt. 3, p. 24, pl. 6, fig. 1.; MÖRICKE, 1894, Neues Jahrb., Beil.-Bd. 9, p. 50.; TORNQUIST, 1898, Pal. Abhandl., n.F., Bd. 4, p. 165; LAMBERT, 1944, Mus. La Plata, Revista, n. ser. (sec. Pal.), vol. 2, p. 364, pl. 2, fig. 6,7.

*Material.*—Two specimens (L. 88540–1).

*Remarks.*—These are costate trigonias in which the height is considerably in excess of the length and the moderately wide-spaced costae lose their regular concentric arrangement near the anterior margin, bending first up and then down. A similar irregularity is well shown in Gottsche's original figures of the species, the type locality of which was Espinazito, in the Argentinian Cordillera, where the beds are of Bajocian age. Möricke subsequently recorded it from the Inferior Oolite of Chile. A specimen from the Callovian of Neuquen (Argentina) referred to it by Weaver (1931, p. 240, pl. 20, fig. 103,104) was a relatively elongate costate *Trigonia* which was almost certainly misidentified. The most similar species from the European Jurassic is *T. elongata* J. de C. Sowerby, which first appears in the Fuller's Earth and occurs again in the Cornbrash. Its ribs are not so irregular at their anterior end as in the South American species.

*Locality.*—Four km. upstream from mouth of Río Grande.

Family LUCINIDAE
Genus LUCINA Lamarck, 1799
LUCINA cf. L. BELLONA d'Orbigny
Pl. 128, fig. 2

[cf.] *Lucina lyrata* Phillips var. *transversa* D'ARCHIAC, 1843, Soc. géol. France Mém., vol. 5, p. 372, pl. 26, fig. 3*a-c*.

[cf.] *Lima Bellona* D'ORBIGNY, 1850, Prodrome, vol. 1, p. 309; MORRIS & LYCETT, 1853, Mollusca from the Great Oolite, Bivalves, p. 67, pl. 6, fig. 18,18a; MARZLOFF, 1936, Lab. géol. Lyon Trav., fasc. 28, p. 101, pl. 11, fig. 19–21.

*Material*—One specimen (L. 88539).

*Remarks.*—The specimen is an internal mould 55 mm. long, bearing traces of thin concentric ridges which are up to 6 mm. apart. In shape it agrees well with the internal mould from England represented by Morris & Lycett in their fig. 18a, but its concentric ridges are more wide-spaced than in European specimens, so that it seems desirable to qualify its identification. Oppel (1856, p. 529 [409]) briefly described a new species *Lucina wrighti*, placing in its synonymy "*L. bellona* Morris and Lycett *pars*." His intention was to distinguish a form which occurs in the Inferior Oolite, and was possibly represented by fig. 18a of Morris & Lycett, from the typical *L. bellona* of the Great Oolite, but it is doubtful if specimens from the two formations can be separated specifically. In Europe *L. bellona* first appears in the upper Lias. Jaworski (1914, p. 299) has reported its presence in the Dogger of Piedra pintada, Argentina, but has given no figures or detailed description of the specimens.

*Locality.*—Four km. upstream from mouth of Río Grande.

LUCINA GOLIATH Gottsche
Pl. 128, fig. 4

*Lucina goliath* GOTTSCHE, 1878, Palaeontographica, Supp. 3, Lief. 2, Abt. 3, p. 28, pl. 5, fig. 11.; JAWORSKI, 1915, p. 446.; STEINMANN, 1929, Geologie von Perú, p. 78,79, text-fig. 92.

*Material.*—Two specimens (L. 88552–3).

*Remarks.*—Gottsche founded this species upon a very incomplete right valve from the Inferior Oolite of the Espinazito pass, in the Argentinian Cordillera, but Steinmann's subsequent figure of a specimen from the Inferior Oolite of Chunumayo, Peru, was rather more satisfactory. No adequate description of the species has, however, been published. Concentric ridges appear to have been more marked and evenly spaced in Steinmann's specimen than in Gottsche's. Gottsche figured the hinge of his type specimen, the chief feature being a large, blunt sub-umbonal tooth, but at present it is only possible to refer the species to *Lucina*, sensu lato.

The specimens now recorded are well inflated shells with an oval outline and a rather narrowly rounded anterior extremity situated above mid-height. The posterior end is not well preserved, but does not appear to have been truncated. The ventral margin is rather strongly convex; in one specimen it undulates irregularly at its anterior end, possibly owing to some accident in growth. The surface bears irregular concentric rugae, regular ridges like those represented in Steinmann's figure being absent. In both specimens the dorsal region is obscured by adherent matrix. When complete, the better preserved one was about 65 mm. long and 55 mm. high. It is preserved with its two valves partly opened along the ventral margin, thus increasing its apparent convexity. The convexity of each valve is about 17.5 mm.

*Locality.*—1.4 km. E by S of Puerto Caballa.

Family PLEUROMYIDAE
Genus PLEUROMYA Agassiz, 1842
PLEUROMYA UNIFORMIS (J. Sowerby)
Pl. 128, fig. 3

*Unio uniformis* J. SOWERBY, 1813, Mineral Conchology, vol. 1, p. 83, pl. 33, fig. 4.
*Pleuromya jurassi* Agássiz, GOTTSCHE, 1879, Palaeontographica, Supp. 3, Lief. 2, Abt. 3, p. 32, pl. 7, fig. 5a,b; BURCKHARDT, 1900, Mus. La Plata Anales (Sec. Geol. Min.), vol. 2, p. 35, pl. 21, fig. 12,13.

*Material.*—Several specimens.

*Remarks.*—In view of its priority, the name *P. uniformis* has now come into general use for the *Pleuromya* which is widespread in the Jurassic of Europe, where it ranges from the Inferior Oolite to the Portland beds and was formerly known by the specific names *jurassi* (Brongniart), *decurtata* (Phillips), *tellina* Agassiz and *voltzi* Agassiz. Records of the Liassic species *P. striatula* Agassiz from the Inferior Oolite of Argentina may also refer to *P. uniformis*. The specimens from that country recorded by Gottsche and Burckhardt as *P. jurassi* were of Bajocian age.

*Locality.*—Four km. upstream from mouth of Río Grande.

Family LATERNULIDAE
Genus CERCOMYA Agassiz, 1843
CERCOMYA UNDULATA (J. de C. Sowerby)
Pl. 128, fig. 8

*Sanguinolaria undulata* J. DE C. SOWERBY, 1827, Mineral Conchology, vol. 6, p. 91, pl. 548, fig. 1,2.
*Cercomya pinguis* AGASSIZ, 1843, Monographie des Myes, p. 145, pl. 11, fig. 19–21; pl. 11a, fig. 17,18.
*Cercomya Inglesia* MÖRICKE, 1894, Neues Jahrb., Beil.-Bd. 9, p. 58, pl. 2, fig. 8.
*Cercomya undulata* MÖRICKE, 1894, loc. cit., p. 58.

*Material.*—One specimen (L. 88542).

*Remarks.*—The specimen is about 35 mm. high; its posterior end is now broken away, but its original length was probably about 90 mm. It agrees well with specimens of *C. undulata* from Europe, where the range of the species is from the Bajocian to the Oxfordian or higher. *C. pinguis* must be regarded as a synonym, as suspected by Agassiz himself, and I see no reason for the separation of Möricke's *C. inglesia*. The last author recorded *C. undulata* from the Inferior Oolite of Chile, and his *C. inglesia* was either of upper Liassic or of Inferior Oolite age.

*Locality.*—Four km. upstream from mouth of Río Grande.

CERCOMYA PERUVIANA, n. sp.
Pl. 128, fig. 7

*Material.*—The holotype only (L. 88543).

*Description.*—Of medium size, resembling *C. undulata* in shape, allowing for the fact that its posterior extremity is broken away. A slightly convex, smooth area, running from the umbo perpendicularly to the ventral margin and distinctly limited by a faint ridge on the anterior side, separates an anterior part of the surface bearing strong concentric folds from a posterior part which has rather unevenly spaced radial threads but no concentric ornament except growth lines; the threads are most closely arranged posteriorly and are eight in number on the part of the surface still preserved (it is improbable that more were present).

*Measurements.*—Original length (estimated) 75 mm., height 30 mm.

*Remarks.*—This species much resembles *Cercomya punctata* Stanton (1899, p. 628, pl. 74, fig. 5), from beds of probably Callovian age in the Yellowstone National Park, a species with which *C. semiradiata* Whiteaves (1900, p. 288, pl. 37, fig. 4), from the Callovian upper Yakoun formation of British Columbia (see McLearn, 1949, p. 11), appears synonymous. McLearn (1924,

p. 56, pl. 9, fig. 11) has figured a distorted specimen, the specific identification of which does not seem to have needed qualifying, from the Callovian Fernie formation of Alberta, Canada. In *C. punctata*, however, the radial threads on the posterior part of the surface appear to be weaker and more crowded than in the species now described and the smooth median sector is wider. *C. versicostata* (Buvignier) (1852, p. 10, pl. 9, fig. 11–13), with which *C. magnifica* (Contejean) (1860, p. 349, pl. 27, fig. 1,2) is synonymous, is a comparable species found in the Kimmeridgian of Europe, but its radial threads carry beads.

*Locality.*—Four km. upstream from mouth of Río Grande.

REFERENCES


BUVIGNIER, A., 1860, Statistique géologique, minéralogique, minérallurgique et paléontologique du département de la Meuse, Atlas: Paris.

CONTEJEAN, C., 1860, Étude de l'étage kimméridien dans les environs de Montbéliard: Soc. Émul. Doubs Mém., ser. 3, vol. 4, p. 1–352, pl. 1–27.

COSSMANN, M., 1898, Contribution à la paléontologie française des terrains jurassiques. Gastropodes: Nérinées; Soc. géol. France Mém., Paléont. no. 19.

COX, L. R., 1943, The English Upper Lias and Inferior Oolite species of *Lima:* Malac. Soc. London Proc., vol. 25, p. 151–187, pl. 6–29.

——, 1949, On the genotype of *Nerinea;* with a new subgeneric name *Eunerinea:* Malac. Soc. London, Proc., vol. 27, p. 248–250.

DECHASEAUX, C., 1936, Limidés jurassiques de l'est du Bassin de Paris: Mus. roy. Hist. nat. Belgique Mém., ser. 2, fasc. 8.

DOUGLAS, J. A., 1920, Geological sections through the Andes of Peru and Bolivia: II—From the port of Mollendo to the Inambari River: Geol. Soc. London, Quart. Jour., vol. 76, p. 1–59, pl. 1–6.

IMLAY, R. W., 1952, Correlation of the Jurassic formations of North America, exclusive of Canada: Geol. Soc. Am., Bull., vol. 63, p. 953–992.

JAWORSKI, E., 1912, Beiträge zur Kenntnis des Jura in Süd-Amerika. I: Allgemeiner Teil: Neues Jahrb., Beil.-Bd. 37, p. 285–342.

——, 1915, Beiträge zur Kenntnis des Jura in Süd-Amerika. II: Spezieller, paläontologischer Teil: Neues Jahrb., Beil.-Bd. 40, p. 364–456, pl. 5–8.

——, 1926, La fauna del Lias y Dogger de la Cordillera Argentina en la parte meridional de la provincia de Mendoza: Acad. nac. Cienc. Cordoba Act., vol. 9, p. 137–318, pl. 1–4.

LORIOL, P. DE, 1874, Monographie paléontologique des étages supérieurs de la formation jurassique des environs de Boulogne-sur-Mer [Pt. 1]: Soc. Phys. Hist. nat. Genève Mém., vol. 23, p. 261–407, pl. 1–10.

MCLEARN, F. H., 1924, New pelecypods from the Fernie formation of the Alberta Jurassic: Roy. Soc. Canada, Trans., ser. 3, vol. 18, sect. 4, p. 39–61, pl. 1–9.

——, 1949, Jurassic formations of Maude Island and Alliford Bay, Skidegate Inlet, Queen Charlotte Islands, British Columbia: Canada Dept. Mines Geol. Survey, Bull. no. 12.

MÖRICKE, W., 1894, Versteinerungen des Lias und Unteroolith von Chile: Neues Jahrb., Beil.-Bd. 9, p. 1–100, pl. 1–6.

OPPEL, A., 1856–8, Die Juraformation Englands, Frankreichs und des südwestlichen Deutschlands: Württemb. naturw. Jahreshefte, Jahrg. 12, p. 121–558, Jahrg. 13, p. 141–396, Jahrg. 14, p. 129–291.

QUENSTEDT, F. A., 1856–8, Der Jura: Tübingen.

SOWERBY, J. DE C., 1836, Appendix A to W. H. Fitton, Observations on some of the strata between the Chalk and the Oxford Oolite in the south-east of England: Geol. Soc. London, Trans., ser. 2, vol. 4, p. 335–349, pl. 11–23.

STANTON, T. W., 1899, Mesozoic fossils: U. S. Geol. Survey Mon. 32, part 2, p. 600–640, pl. 72–76.

STEINMANN, G., 1929, Geologie von Perú: Heidelberg.

WEAVER, C. E., 1931, Paleontology of the Jurassic and Cretaceous of West Central Argentina; Univ. Washington Mem. 1.

WHITEAVES, J. F., 1884, On the fossils of the coal-bearing deposits of the Queen Charlotte Islands collected by Dr. G. M. Dawson in 1878: Geol. Survey Canada, Mesozoic Fossils, vol. 1, p. 191–262, pl. 21–33.

——, 1900, On some additional or imperfectly understood fossils from the Cretaceous rocks of the Queen Charlotte Islands: Geol. Survey Canada, Mesozoic Fossils, vol. 1, p. 263–307, pl. 34–39.


MANUSCRIPT RECEIVED FEBRUARY 1, 1956