THE

PLIOCENE MOLLUSCA

OF

GREAT BRITAIN,

BEING SUPPLEMENTARY TO

S. V. WOOD'S MONOGRAPH OF THE CRAG MOLLUSCA.

BY

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SYSTEMATIC INDEX.

PREFACE.

THE late author of this Monograph realized his wish to complete his account of the Pliocene Gasteropoda before his death, which occurred on April 11th, 1923. Part III of his second volume had been passed by him for press several months before its publication, and the fourth and concluding part was also ready. An Index to the second volume had been compiled by him, but Sir Arthur Smith Woodward has kindly undertaken to have this work done independently, in order to assure the accuracy which is so important in an Index.

Mr. Harmer had intended to express his sincere thanks to all those friends at home and abroad who had helped him in difficulties by the loan or gift of specimens for comparison, or by the determination of critical forms. This duty he left for his son, Sir Sidney Harmer, and myself to carry out, in his name and for him.

With the exception of the Oysters and Astartes, not more than twenty species of Bivalves new to the Pliocene Formations, or not figured by Mr. Searles V. Wood in his "Crag Mollusca," were noticed by Mr. Harmer and myself in the collections to which we have had access. We had proposed writing a joint Memoir on the Pelecypoda, but it was not to be. The large series of Astartes which Mr. Harmer intended to work out, and such others of the new forms as we possessed (excluding Oysters), are in the British Museum (Natural History), to which the greater part of the collection has been given. The figured specimens corresponding with the Monograph as published are, however, mostly in the Sedgwick Museum at Cambridge. The Oysters, of which I have photographs of sixty well-marked forms, are now being worked out by myself. Students of this difficult group will find an almost complete series of these shells, including my own collections, exhibited in the extensive series of Crag fossils in the Ipswich Museum.

ALFRED BELL.

IPSWICH MUSEUM;
September, 1924.

Palæontographical Society, 1922.

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Genus **RISSOA**, Frémenville, 1813 (*continued from Vol. II, p.* 625).

Rissoa Searlesii, sp. nov. Plate LXV, fig. 1.

1893—98. *Rissoa pulcherrima*, A. Bell, Proc. Roy. Irish Acad. [3], vol. ii, p. 629, 1893; Trans. Roy. Geol. Soc. Cornwall, vol. xii, p. 152, 1898.

Specific Characters.—Shell minute, ovate, conical; whorls 5, tumid, the last ventricose, much the largest, three-fifths the total length; the last ornamented by numerous very fine longitudinal costæ, oblique and closely set, which cease abruptly at the periphery, where they are interrupted by an inconspicuous spiral ridge; base and upper whorls without sculpture; spire very short, rapidly diminishing to a compressed point; suture rather deep; base of the shell rounded; mouth small, oval, not expanded; outer lip gently curved; inner lip reflected on the pillar with a small umbilical chink.

Dimensions.—L. 1 mm. B. 0·75 mm.

Distribution.—Not known living.

Fossil: St. Erth.

Remarks.—This minute fossil was originally described by Mr. A. Bell as a new species under the name of *R. pulcherrima*, but as that name has been already used by Jeffreys for a different species,[1] I suggest it should be called after my old friend Searles V. Wood the younger, who was the first to call attention to the St. Erth deposit, and was at work on it at the time of his rather sudden, premature, and ever-to-be-lamented decease.

Rissoa selseyensis, sp. nov. Plate LXV, fig. 2.

Specific Characters.—Shell minute, ovate; whorls 5, flattened, the last about two-thirds the total length, rounded below; spire angularly diminishing upwards to a compressed but acute apex; mouth oval, angulated above; outer lip slightly expanded.

Dimensions.—L. 2 mm. B. 1 mm.

Distribution.—Not recorded living.

Fossil: Selsey.

Remarks.—The shell here represented is from the Yorkshire Museum, where it had been labelled *Rissoa deliciosa*, Jeffreys, Selsey. It differs so materially, however, from the one figured by him under that name in his paper on the Mollusca of the "Lightning" and "Porcupine" Expeditions (Proc. Zool. Soc., 1884, p. 121, pl. ix, fig. 7), as well as from that described by A. Bell (Rep. Yorks. Phil.

[1] Brit. Conch., vol. iv, p. 42.

Soc., p. 75, pl. i, fig. 25, 1892), that I am inclined to think some mistake has been made in its identification with Jeffreys' shell. I describe it therefore as new, as I am unable to find any recognised species to which it can be satisfactorily referred.

Sub-genus **APICULARIA**, Monterosato, 1884.

Rissoa (Apicularia) similis (Scacchi). Plate LXV, fig. 3.

1836. *Rissoa similis*, Scacchi, Cat. Conch. Reg. Neap., p. 14, no. 28.
1844. *Rissoa similis*, Philippi, Enum. Moll. Sic., vol. ii, p. 124, pl. xxiii, fig. 5.
1873. *Rissoa similis*, Weinkauff, Cat. europ. Meeresconch., p. 18, no. 290.
1874—76. *Rissoa similis*, Seguenza, Boll. R. Com. Geol. Ital., vol. v, p. 4, no. 365, 1874; vol. vii, p. 102, no. 662, 1876.
1878. *Rissoa similis*, de Stefani e Pantinelli, Bull. Soc. Malac. Ital., vol. iv, p. 170.
1878. *Rissoa similis*, de Stefani e Pantinelli, Bull. Soc. Malac. Ital., p. 170.
1884. *Rissoa similis*, Jeffreys, Proc. Zool. Soc. London, p. 117.
1884. *Rissoa similis*, Bucquoy, Dautzenberg et Dollfus, Moll. mar. Rouss., vol. i, p. 265, pl. xxxii, fig. 6.
1884. *Apicularia similis*, Monterosato, Nom. Gen. e. Spec. Conch. Medit., p. 56.
1886. *Rissoa similis*, Watson, Rep. Voy. "Challenger," vol. xv, p. 587.
1887. *Rissoia* (*Apicularia*) *similis*, P. Fischer, Man. Conch., p. 720.
1890. *Rissoa similis*, Carus, Prod. Faun. Medit., vol. ii, p. 319.
1892. *Rissoa similis*, Locard, Coq. mar. Côtes de France, p. 172.
1914. *Rissoia* (*Apicularia*) *similis*, Cerulli-Irelli, Palaeont. Ital., vol. xx, p. 191, pl. xv, figs. 28—30.

Specific Characters.—Shell minute, subtransparent, somewhat elongated; whorls 6 or 7, convex; ornamented by strong, rounded longitudinal costæ, which die out on the last whorl, and by fine punctuated spiral ridges which extend over the base; mouth rather small, rounded below, angulated above.

Dimensions.—L. 3·5 mm. B. 1·5 mm.

Distribution.—Recent: Scarborough to western coasts of France and Spain. Mediterranean, Adriatic. Madeira. Canaries.

Fossil: St. Erth.

Pliocene: Madeira, Tuscany, Monte Mario, Altavilla.

Pleistocene: Livorno, Messina, Monte Pellegrino, Reggio, Rhodes.

Remarks.—The subgeneric name *Apicularia* was adopted by the Marchese di Monterosato and one or two others for a group of *Rissoas* characterised by a swelling of the penultimate whorl, a feature which he says is not present in the true *Rissoas*. The specimen now figured, belonging to the British Museum (no. 18112), which was identified by Mr. Bell with *R. similis*, seems to have lost the body-whorl, the last one preserved being apparently the last but one. The name of this southern species does not occur in our Crag lists, nor is it included in those given by Mr. Bell of the St. Erth fossils. I adopt provisionally, however,

the identification of our shell with the present form. Unfortunately the specimen figured has been mislaid.

Rissoa pulchella, Philippi (*non* Wood). Plate LXV, fig. 4.

1836—44. *Rissoa pulchella*, Philippi, Enum. Moll. Sic., vol. i, p. 155, pl. x, fig. 12, 1836; vol. ii, p. 127, 1844.
1848. *Rissoa pulchella*, S. V. Wood, Mon. Crag Moll., pt. i, p. 104, pl. xi, fig. 9.
1874—76. *Rissoa pulchella*, Seguenza, Boll. R. Com. Geol. Ital., vol. v, p. 4, no. 363, 1874; var. *minor*, vol. vii, p. 102, no. 666, 1876.
1878—84. *Rissoa pulchella*, Monterosato, Enum. e Sinon. Conch. Medit. (Giorn. Soc. Sci. Nat. Palermo, vol. xiii, p. 83), 1878; *Sabanea pulchella*, Nomen. e Sinon. Conch. Medit., p. 55, 1884.
1890. *Rissoa pulchella*, Carus, Prod. Faun. Medit., vol. ii, p. 325.
1892. *Rissoia pulchella*, Locard, Coq. mar. Côtes de France, p. 171.
1898. *Rissoa pulchella*, Bucquoy, Dautzenberg et Dollfus, Moll. mar. Rouss, vol. ii, p. 796.

Specific Characters.—Shell small, ovato-conical; whorls 5—6, convex, the last ventricose with a rounded base, ornamented by inconspicuous longitudinal costæ which die out at the periphery, but without spiral sculpture; mouth ovate, nearly equalling the spire in length.

Dimensions.—L. 4 mm. B. 2 mm.

Distribution.—*Recent:* Mediterranean, Adriatic, Ægean.

Fossil: Coralline Crag: Sutton.

Pleistocene: Monte Pellegrino, Reggio, Taranto.

(Var. *minor*.) Upper Pliocene: Altavilla.

Remarks.—In the first part of his Monograph of 1848 Wood described a specimen (pl. xi, fig. 9), identifying it with the *R. pulchella* of Philippi, but afterwards, in his 1st Suppl. (pt. ii, p. 209, 1874), he expressed the opinion that this was a mistake, grouping it with the *R. semicostata* of S. Woodward (*q. v.*) figured on the same plate (xi, fig. 10). Mr. Bell, however, has lately discovered a specimen from the Coralline Crag of Sutton which he considers the true *R. pulchella* of Philippi—it is here given under that name.

R. pulchella is a Mediterranean species, unknown from British seas, which does not seem out of place at the Crag horizon named. It has not been reported from St. Erth.

Rissoa obsoleta (S. V. Wood). Plate LXV, figs. 5, 6.

1842—48. *Rissoa obsoleta*, S. V. Wood, Ann. Mag. Nat. Hist. [1], vol. ix, p. 533, 1842; Mon. Crag Moll., pt. i, p. 105, pl. xi, fig. 11, 1848.
1871. *Rissoa obsoleta*, Jeffreys in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 145.
1872. *Rissoa obsoleta*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, p. 204.
1892. *Rissoa obsoleta*, Van den Broeck, Bull. Soc. Belg. Géol., vol. vi (Mémoires), pp. 123, 133.

Specific Characters.—Shell minute, ovato-conical; whorls 5, decidedly convex and tumid; smooth or ornamented by very fine spiral striæ more or less obsolete on the whorls but stronger on the base of the shell; suture deep; spire rather short, rapidly diminishing in size upwards; peristome continuous, with a small umbilical chink behind it; mouth sub-circular; angulate above, not expanded, ridged internally; outer lip thickened and varicose.

Dimensions.—L. 4 mm. B. 2 mm.

Distribution.—Not known living.

Fossil: Coralline Crag: Sutton. Red Crag: Butley. Belgium—Scaldisien, Poederlien.

Remarks.—This minute fossil which Wood, Jeffreys and the Brothers Bell considered a distinct species, has been recorded from the Scaldisien and Poederlien of Antwerp and from the bed of Coralline Crag at Sutton, where so many small shells have been obtained. In some specimens the spiral striæ have entirely disappeared, probably owing, in Wood's opinion, to a partial decomposition of the exterior coating. Out of nearly 100 specimens in the Norwich Museum identified by him, but few show any trace of the original sculpture. I figure one of these (fig. 6) showing the spiral marking, copied from Wood's Monograph (pl. xi, figs. 11*a*, 11*b*,) together with another (fig. 5) from Butley, belonging to the Yorkshire Museum, from which this striation has nearly disappeared.

Rissoa deliciosa, var. **multicostata**, Jeffreys. Plate LXV, fig. 7.

1884. *Rissoa deliciosa*, var. *multicostata*, Jeffreys, Proc. Zool. Soc., p. 121.

Specific Characters.—Shell minute, solid, ovate; whorls 4—5, slightly convex, the last tumid, much the largest, three-fourths the total length, wide and rounded at the periphery; spire short, rapidly diminishing to a blunt point; ornamented by fine, numerous and inconspicuous costæ which do not extend to the base, as well as by almost invisible spiral lines; mouth oval, nearly half the length of the shell, obtusely angulate above, a little expanded below; outer lip gently curved; inner lip nearly straight, continuous with the latter.

Dimensions.—L. 2 mm. B. 1 mm.

Distribution.—*Recent:*

Fossil: St. Erth.

Remarks.—The present shell belongs to the Warburton Collection at the British Museum where it is labelled *Rissoa deliciosa*, no. 18110. It is not the typical *R. deliciosa* of Jeffreys (Proc. Zool. Soc., *op. cit.*, pl. ix, fig. 7), as that species has strong and coarse sculpture, although the form of our shell and of its mouth are strikingly similar to it (*q.v.*). Jeffreys describes a variety (*multicostata*), *op. cit.*, p. 121, however, in which he says the longitudinal ribs are more numerous and

delicate, sometimes disappearing altogether, being also connected with this type by intermediate gradations. To this variety probably our shell may be referred.

Rissoa ambigua, sp. nov. Plate LXV, fig. 8.

Specific Characters.—Shell small, ovato-conical; whorls 6, convex, the last rounded, one half the total length; spire regularly diminishing in size to a blunt point, the upper part ornamented by about 20 fine longitudinal costæ, the lower worn and obscure; suture well marked; mouth short, subcircular, expanded and patulous below; outer lip thin, gently curved, obtusely angulate above, peristome slight.

Dimensions.—L. 4 mm. B. 2 mm.

Distribution.—Not recorded living.

Fossil: Coralline Crag: Gomer pit near Orford.

Remarks.—The fossil now figured is from the Sedgwick Museum at Cambridge, where it has been called *Litiopa papillosa*, but I think in error. It resembles it in form only, but partly in sculpture. When perfect it must have been a charming little shell, deserving notice. I give it a provisional name in the hope that a more satisfactory specimen may turn up hereafter. At present I am unable to discover anything else to which it may be safely referred.

Rissoa confinis, S. V. Wood. Plate LXV, fig. 9.

1842—48. *Rissoa confinis*, S. V. Wood, Ann. Mag. Nat. Hist. [1], vol. ix, p. 533, 1842; Mon. Crag Moll., pt. i, p. 104, pl. xi, 1848.
1871. *Rissoa confinis*, Jeffreys in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, pp. 145, 490.
1872. *Rissoa confinis*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, pp. 204, 214.
1890. *Rissoa confinis*, C. Reid, Plioc. Dep. Brit., p. 255.

Specific Characters.—Shell minute, ovato-conical, fairly thick and strong; whorls 5, slightly convex, the last ventricose, much the largest; ornamented by flexuous longitudinal costæ, extending to the suture and nearly to the base, and by exceedingly fine and inconspicuous spiral lines; suture deep; apex blunt; mouth sub-circular, angulated above; outer lip thickened, dentated within; inner lip partly reflected, with a small umbilicus; peristome continuous.

Dimensions.—L. 5 mm. B. 3 mm.

Distribution.—Not known living.

Fossil: Coralline Crag: Sutton. Gedgrave. Waltonian: Walton-on-Naze, Little Oakley. Butleyan: Butley.

Remarks.—This shell, which has only been recorded from the English Crag, has been recognised as a distinct species by Wood, Jeffreys, the brothers Bell and C. Reid, the first-named of whom notes its resemblance to *R. parva*, Mont. It is

said by Wood to be very abundant at Sutton. The specimen figured is from the Wood Collection at the Norwich Museum, named in his writing *R. confinis*.

Rissoa boytonensis, sp. nov. Plate LXV, fig. 10.

Specific Characters.—Shell small, conical; whorls 5, slightly convex, the last three-fifths the total length, with a rounded base; ornamented by strong oblique longitudinal costæ which do not reach the base and are rather widely separated; spire acute, regularly diminishing in size to a blunt point; suture slight; mouth small, sub-circular; peristome continuous, not very distinct; outer lip gently curved.

Dimensions.—L. 4 mm. B. 1·60 mm.

Distribution.—Not recorded living.

Fossil: Coralline Crag: Boyton.

Remarks.—The minute shell figured under this title was found at Boyton by Mr. Bell, and is thought by him to be an undescribed species. It might be possibly regarded as a variety of some unrecognised *Rissoa*, but the difficulty is to decide to which it is most nearly allied. I offer no apology, therefore, in suggesting for it a provisional name, which might be regarded as varietal hereafter, if thought desirable. My specimen is an interesting one and nearly perfect.

Rissoa suttonensis, sp. nov. Plate LXV, fig. 11.

Specific Characters.—Shell small, elongato-conical; whorls 6—7, slightly convex, the last about half the total length; spire slender, regularly diminishing in size to a blunted point; suture slight, ornamented by rather strong and closely set longitudinal costæ, nearly straight, and by spiral ridges reaching to the base; mouth short, sub-circular, angulated above; outer lip thickened and varicose.

Dimensions.—L. 3 mm. B. 1 mm.

Distribution.—Not known living.

Fossil: Coralline Crag: Sutton.

Remarks.—The specimen now described belongs to the Yorkshire Museum, where it has been referred to the *Rissoa abyssicola* of E. Forbes. As this identification appears a doubtful one, I venture to suggest for the shell the name here adopted. It seems to have been obtained from the bed of small shells in the pit of Coralline Crag at Sutton, often alluded to in certain parts of this work. Both in form and sculpture our fossil seems to me to differ materially from the figures published by Forbes, Jeffreys and other later authorities as *R. abyssicola*.

Genus **CINGULA**, Fleming, 1828 (*continued from Vol. II, p.* 637).

Cingula soluta (Philippi). Plate LXV, fig. 12.

1844. *Rissoa soluta*, Philippi, Enum. Moll. Sic., vol. ii, p. 130, pl. xxiii, fig. 18.
1850. *Rissoa soluta*, S. V. Wood, Mon. Crag Moll., pt. ii, p. 318, pl. xxxi, fig. 10.
1853. *Rissoa soluta*, Forbes and Hanley, Brit. Moll, vol. iii, p. 131, pl. lxxv, figs. 3, 4.
1859. *Rissoa soluta*, G. B. Sowerby, Ill. Ind. Brit. Shells, pl. xiv, fig. 2.
1867—84. *Rissoa soluta*, Jeffreys, Brit. Conch., vol. iv, p. 45, 1867; vol. v, p. 208, pl. lxviii, fig. 7, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 145, 1874; Proc. Zool. Soc. London, p. 126, 1884.
1872. *Rissoa soluta*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, p. 204.
1874. *Rissoa* (*Cingula*) *soluta*, Seguenza, Boll. R. Com. Geol. Ital., vol. v, p. 6, no. 413.
1877. *Rissoa soluta*, Dollfus, Bull. Soc. Géol. Normandie, vol. vi, p. 516.
1878. *Cingula soluta*, G. O. Sars, Moll. Reg. Arct. Norv., p. 359.
1878. *Rissoa soluta*, Reeve, Conch. Icon., vol. xx, pl. vi, fig. 1.
1890. *Rissoa soluta*, Carus, Prod. Faun. Medit., vol. ii, p. 338.
1892—98. *Rissoa soluta*, A. Bell, Rep. Yorks. Phil. Soc., p. 63, 1892; Proc. Roy. Irish Acad. [3], vol. ii, p. 630, 1893; Trans. Roy. Geol. Soc. Cornwall, vol. xii, p. 153, 1898.
1901. *Cingula soluta*, Brøgger, Norges geol. Undersøgelse, vol. xxxi, pp. 588, 660, pl. xviii, fig. 3.
1901. *Setia obtusa*, Conch. Soc. List, Journ. of Conch., vol. x, p. 18, no. 352.

Specific Characters.—Shell minute, globose, fairly solid; whorls 5, convex, the last about two-thirds the total length, ornamented by extremely fine spiral striæ, hardly visible except under the microscope; spire very short, with a blunt apex; suture deep; mouth rounded; outer lip slightly thickened; inner lip reflected at the base with a small umbilical chink.

Dimensions.—L. 1·0 mm. B. 0·75 mm.

Distribution.—*Recent*: Coralline zone in North Britain, Shetland and the Hebrides, the Irish Coast and the English Channel. Norwegian Coast and as far north as Finmark. Mediterranean, Adriatic.

Fossil: St Erth. Coralline Crag: Sutton. Selsey.

Pleistocene: Sicily. *Tapes*-banks—Christiania fiord.

Remarks.—There seems some difference of opinion as to whether the Crag *R. soluta* and that of Philippi are the same. Wood seemed rather doubtful about it as is the Marchese di Monterosato, but Jeffreys says he had carefully compared the British and Mediterranean specimens and believed that Philippi's figure and description fairly represent our shell. They evidently belong to the same group. I am inclined to agree with Jeffreys. The specimen here figured is one of three obtained at Selsey belonging to the Yorkshire Museum, and numbered Y. 96. They show but faint, if any of the spiral striation generally mentioned by those who have described this species. Wood, however, says distinctly that his shell was smooth.

Genus **CERATIA,** H. and A. Adams, 1854 (*continued from Vol. II, p.* 644).

Ceratia Millettii (Etheridge and Bell). Plate LXV, fig. 13.

1893—98. *Rissoa Millettii*, A. Bell, Proc. Roy. Irish Acad. [3], vol. ii, p. 630, 1893; Trans. Roy. Geol. Soc. Cornwall, vol. xii, p. 153, 1898.

Specific Characters.— Shell minute, conical; whorls 5, convex, the last much the largest; ornamented by exceedingly fine and delicate spiral lines, which are uniform to the base and are hardly visible without the aid of a lens, with some faint lines of growth; spire regularly diminishing towards a blunt point; suture fairly deep; mouth ovate; inner lip reflected upon the pillar; peristome continuous.

Dimensions.—L. 3 mm. B. 1·5 mm.

Distribution.—Not known living.

Fossil: St. Erth.

Remarks.—This beautiful little shell, obtained by Mr. A. Bell at St. Erth, is, as far as he knows, unique as a British fossil as well as new to science. It belongs to the *Ceratia* group, of which *C. proxima* is taken as the type, distinguished by its minute and regular though inconspicuous spiral sculpture.[1]

Our shell resembles *C. proxima* in this, but it has a more conical and much shorter spire, less ventricose whorls and a shallower suture. Mr. Bell says it is larger and more swollen than *R. soluta*, covered with closely packed spiral lines round the whorls. (See pencil drawing on back of the tablet.)

Ceratia consimilis, sp. nov. Plate LXV, fig. 15.

Specific Characters.—Shell minute, solid, polished; whorls 5, convex, the last about two-thirds the total length; spire regularly diminishing to a blunt depressed point; suture well marked; mouth small, oval; peristome thin, continuous, with a very slight chink behind the inner lip.

Dimensions.—L. 2 mm. B. 1 mm.

Distribution.—Not recorded living.

Fossil: St. Erth.

Remarks.—The specimen here given belongs to the British Museum, where it is called *R. soluta* (no. 10270). I am inclined to think that species is more correctly represented by the Selsey shell figured on my Plate LXV, fig. 12, although the two forms apparently belong to the same group. I therefore propose for it the provisional specific name *consimilis*.

[1] The Marchese di Monterosato remarks as to this group, that there are also certain anatomical differences in the animal which distinguish it from other genera of the Rissoidæ.

Genus **ALVANIA**, Risso, 1826. (*Continued from Vol. II, p.* 606.)

Alvania calathus (Forbes and Hanley). Plate LXV, fig. 14.

1853. *Rissoa calathus*, Forbes and Hanley, Brit. Moll., vol. iii, p. 82, pl. lxxviii, fig. 3.
1859. *Rissoa calathus*, G. B. Sowerby, Ill. Ind. Brit. Shells, pl. xiii, fig. 9.
1867—84. *Rissoa calathus*, Jeffreys, Brit. Conch., vol. iv, p. 11, 1867; vol. v, p. 207, pl. lxvi, fig. 4, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 145, 1871; Proc. Zool. Soc. London, p. 111, 1884.
1872. *Rissoa calathus*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, p. 204.
1873. *Rissoa* (*Alvania*) *calathus*, Weinkauff, Cat. europ. Meeresconch., p. 19, no. 303.
1874—76. *Rissoa* (*Alvania*) *calathus*, Seguenza, Boll. R. Com. Geol. Ital., vol. v, p. 4, no. 375, 1874; vol. vii, p. 102, no. 674, 1876.
1878. *Rissoa calathus*, Reeve, Conch. Icon., vol. xx, pl. v, fig. 39.
1878. *Alvania calathus*, G. O. Sars, Moll. Reg. Arct. Norv., p. 359.
1886. *Rissoa* (*Alvania*) *calathus*, Watson, Rep. Voy. "Challenger," vol. xv, p. 592.
1887. *Rissoa calathus*, Mörch and Poulsen, MS. List in Geological Museum, Copenhagen (unpublished), no. 61.
1890. *Rissoa* (*Alvania*) *calathus*, Carus, Prod. Faun. Medit., vol. ii, p. 332.
1892. *Alvania calathus*, Locard, Coq. mar. Côtes de France, p. 161.
1898. *Rissoa calathus*, Bucquoy, Dautzenberg et Dollfus, Moll. mar. Rouss., vol. ii, p. 797.
1901. *Alvania reticulata*, var. *calathus*, Conch. Soc. List, Journ. of Conch., vol. x, p. 18.
1913. *Rissoa* (*Alvania*) *calathus*, Dautzenberg et Durouchoux, Feuille des Jeunes Natur., vol. xliv, p. 29.

Specific Characters.—Shell oblongo-acute; whorls 6, convex, the last rounded at the base, more than half the total length, cancellated by the intersection of perpendicular and spiral costæ; mouth small, ovate, two-fifths the length; outer lip thickened, coarsely crenated internally; suture marked.

Dimensions.—L. 3 mm. B. 1 mm.

Distribution.—Recent: British seas from the Hebrides to the English Channel, Spanish coast, Mediterranean, Canaries, Azores, Norway (Sars).

Fossil: Coralline Crag: Sutton. Estuarine clays: Belfast. Iceland Crag.

Upper Pliocene: Altavilla.

Pleistocene: Ficarazzi, Monte Pellegrino, Reggio.

Remarks.—There seems some difference of opinion as to whether *A. calathus* should be regarded as a distinct species. Most writers incline to that opinion, but in the Conchological Society's list it is given as a variety of *A. reticulata*; the two seem nearly allied. In most of our illustrated handbooks both forms are figured. It is, however, more coarsely sculptured than the latter, and the longitudinal ribs are more prominent, but it is a somewhat variable shell in size and sculpture. I adopt the British Museum name *calathus* provisionally.

Genus **ONOBA**, H. and A. Adams (*continued from Vol. II, p.* 641).

Onoba truncata (Etheridge and Bell). Plate LXV, fig. 16.

1893—98. *Rissoa truncata*, A. Bell, Proc. Roy. Irish Acad. [3], vol. ii, p. 630, 1893; *R.* (*Onoba*) *truncata*, Trans. Roy. Geol. Soc. Cornwall, vol. xii, p. 153, 1898.

Specific Characters.—Shell minute, oval, short; whorls 4, the two upper ones very small, the others enlarged, convex; ornamented by fine, oblique, almost obsolete costæ; spire sub-cylindrical, abruptly truncated; suture slight; mouth small, obliquely ovate.

Dimensions.—L. 1·5 mm. B. 1 mm.

Distribution.—Not known living.

Fossil: St. Erth.

Remarks.—This minute fossil has been identified by Mr. Bell with one described by him as allied to *Rissoa* (*Onoba*) *striata*, but as truncate, under the above name, and as being shorter and stouter than the type with an oblique mouth, 4 smooth whorls and a blunt apex. I give it provisionally under the name adopted for it at the British Museum (no. 18113).

Genus **BARLEEIA**, Clarke (*continued from Vol II, p.* 645).

Barleeia propinqua, sp. nov. Plate LXV, fig. 17.

Specific Characters.—Shell minute, ovate; whorls 6, flattened, smooth, polished, the last tumid, rounded below, two-thirds the entire length, gradually diminishing to a small but acute, compressed and blunt point; spire short, conical; suture slight; mouth ovate, sharply angulate above, slightly expanded and patulate below; outer lip straight following the contour of the spire, not projecting.

Dimensions.—L. 2 mm. B. 1·5 mm.

Distribution.—Not known living.

Fossil: Coralline Crag: Gedgrave.

Remarks.—The specimen here figured was found at Gedgrave, and belongs to the Sedgwick Museum at Cambridge, where it has been labelled, possibly in error, *Odostomia albella*. As I cannot find anything, either recent or fossil, to which it can be certainly referred, I describe it under the present name, though rather doubtfully, as something new.

Genus **PUNCTURELLA**, Lowe, 1827.

Puncturella noachina (Linné). Plate LXV, fig. 18.

1771. *Patella noachina*, Linné, Mantissa Plantarum, p. 551.
1827. *Puncturella noachina*, Lowe, Zool. Journ., vol. iii, p. 78.
1841—70. *Cemoria noachina*, Gould, Inv. Mass., ed. 1, p. 156, fig. 18, 1841; ed. 2, p. 276, fig. 537, 1870.
1848—72. *Cemoria noachina*, S. V. Wood, Mon. Crag Moll., pt. i, p. 166, pl. xviii, fig. 5, 1848; 1st Supp., pt. i, p. 91, 1872.
1853. *Puncturella Noachina*, Forbes and Hanley, Brit. Moll., vol. ii, p. 474, pl. lxii, figs. 10—12.
1863—84. *Puncturella Noachina*, Jeffreys, Rep. Brit. Assoc. (Newcastle-on-Tyne), p. 73, 1863; Brit. Conch., vol. iii, p. 257, 1865; vol. v, p. 200, pl. lix, fig. 1, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 145, 1871; *Cemoria noachina*, Ann. Mag. Nat. Hist., p. 242, 1872; Proc. Zool. Soc., p. 676, 1882; in Lamplugh, Quart. Journ. Geol. Soc., vol. xl, p. 319, 1884.
1864. *Puncturella Noachina*, S. P. Woodward, Geol. Mag., vol. i, p. 53.
1870. *Puncturella noachina*, A. Bell, Ann. Mag. Nat. Hist. [4], vol. vi, p. 216.
1872. *Puncturella noachina*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, p. 204.
1872. *Puncturella* (*Cemoria*) *noachina*, Dawson, Canad. Natur. [N.S.], vol. vi, p. 84.
1874—76. *Puncturella noachina*, Seguenza, Boll. R. Com. Geol. Ital., vol. v, p. 12, no. 509; p. 334, no. 177, 1874; vol. vi, p. 262, no. 804, 1876.
1878. *Puncturella noachina*, G. O. Sars, Moll. Reg. Arct. Norv., pp. 124, 357.
1901. *Puncturella noachina*, Brøgger, Norges Geol. Undersøgelse, vol. xxxi, p. 653, pl. vi, fig. 27.
1902. *Puncturella noachina*, Conch. Soc. List, Journ. of Conch., vol. x, p. 16, no. 282.
1912. *Puncturella noachina*, Dautzenberg et Fischer, Camp. Sci. Prince de Monaco, vol. xxxvii (Mollusca), p. 288.
1912. *Puncturella noachina*, Odhner, K. Svensk. Vet.-Akad. Handl., vol. xlviii, p. 37, pl. ii, figs. 28—41.
1915. *Puncturella princeps*, Johnson, Bost. Soc. Nat. Hist., Occ. Papers, vol. vii, Fauna of New Engl., no. 13 (Mollusca), p. 86.
1920. *Puncturella noachina*, Bardarson, K. Danske Vid. Selsk., Biol. Medd., vol. ii, pp. 81, 119.

Specific Characters.—Shell small, slightly compressed at the sides; ornamented by 25—30 elevated, radiating ribs with smaller intermediate ones and fine dots or granules arranged in longitudinal rows; lines of growth slight and irregular; beak ribless, incurved, turning to the left, with a lanceolate slit extending some distance from the crown; mouth oval, rather elongate, margin thin, indented by the ribs; inside nacreous, marked by inconspicuous concentric lines and a vaulted sheath covering the slit.

Dimensions.—L. 7—15 mm. B. 6—12 mm. H. 5—8 mm.

Distribution.—Recent: West coast of Great Britain, Shetland to Aberdeen and Scarborough; widely diffused in circumpolar regions from Spitzbergen, Franz Joseph Land and Nova Zembla to Iceland and the Faroe Islands, Greenland to Behring Sea, Sea of Okhotsk and Japan. Norway—Finmark to Christiania Fiord, Sweden. North Sea, Dogger Bank. Coasts of Holland, Belgium, France and Portugal. Southern hemisphere—Straits of Magellan to Kerguelen Island.

Fossil: Coralline Crag: Sutton. Pleistocene: Bridlington.

Remarks.—This shell, originally grouped with *Patella* by Linné and other early writers, has been subsequently referred to the *Rimuru* of Defrance, the *Cemoria* of Leach, and at present to the *Puncturella* of Lowe, with which it is now generally associated. A fine specimen which is now in the Sedgwick Museum was reported as a fossil by Wood from Bridlington. A recent form was known to him from the Arctic Seas of Europe as a boreal species from North America; it has been since ascertained, however, to have an almost world-wide range, specially circumpolar, both in the arctic and antarctic regions. It was obtained by the "Challenger" expedition in the latter over an area extending from the Straits of Magellan to Kerguelen Island—a distance of nearly 150 degrees of longitude—while Messrs. Dautzenberg and Fischer in their description of it (*op. cit.*, p. 288) give a list of 130 works in which it has been alluded to. Dr. Odhner (*op. cit.*, p. 39) states that at different localities it varies very much both in size and the form of the spire, at some varieties being depressed and others elevated.

Genus **BROCCHIA,** Bronn, 1827 (*continued from Vol. II, p.* 770).

Brocchia similis, Biondi, var. **serrata,** M. J. Monterosato. Plate LXV, figs. 22, 23.

Varietal Characters.—Differs from Biondi's type of *B. similis* in form, texture and sculpture; like that species it has a strongly serrated margin below the apex, with fine, inconspicuous markings on the back of the shell.

Dimensions.—L. 18 mm. B. 18 mm.

Distribution.—Not recorded living.

Fossil: Coralline Crag: Gomer Pit.

Sicilian Pleistocene: Monte Pellegrino.

Remarks.—One of the fossils here figured (fig. 22) belongs to the Sedgwick Museum at Cambridge, where it has been identified with a Coralline Crag form, *Capulus militaris.* It corresponds more nearly, however, with a specimen, also figured, from the Pleistocene of Monte Pellegrino, near Palermo (fig. 23), under the varietal name of *serrata*, of which I have received several from the Marchese di Monterosato; they agree generally, but vary somewhat in form and sculpture. The saw-like margin below the apex seems a distinguishing feature.

Genus **ACLIS,** Lovén, 1846.

Aclis supranitida (S. V. Wood). Plate LXV, fig. 24.

1842—72. *Alvania supranitida*, S. V. Wood, Ann. Mag. Nat. Hist. [1], vol. ix, p. 534, 1842; *A. ascaris* (pt.), Mon. Crag Moll., pt. i, p. 99, pl. xii, fig. 11*b*, 1848; *A. supranitida*, 1st Suppl., pt. i, p. 55, 1872.

1846. *Aclis supranitida*, Lovén, K. Svensk. Vet.-Akad. Förh., vol. iii, p. 88.
1853. *Aclis supranitida*, Forbes and Hanley, Brit. Moll., vol. iii, p. 220, pl. xc, figs. 2, 3.
1859. *Aclis supranitida*, G. B. Sowerby, Ill. Ind. Brit. Shells, pl. xiv, fig. 24.
1867—84. *Aclis supranitida*, Jeffreys, Brit. Conch., vol. iv, p. 103, 1867; vol. v, p. 210, pl. lxxii, fig. 3, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 142, 1871; Proc. Zool. Soc. London, p. 343, 1884.
1872. *Aclis supranitida*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, p. 203.
1873. *Aclis supranitida*, Weinkauff, Cat. europ. Meeresconch., p. 23, no. 365.
1873—76. *Aclis supranitida*, Seguenza, Boll. R. Com. Geol. Ital., vol. iv, p. 354, no. 319, 1873; vol. vii, p. 96, no. 588, 1876.
1878. *Aclis supranitida*, G. O. Sars, Moll. Reg. Arct. Norv., p. 360.
1883. *Aclis supranitida*, Reade, Quart. Journ. Geol. Soc., vol. xxxix, p. 323.
1890. *Aclis supranitida*, Carus, Prod. Faun. Medit., vol. ii, p. 295.
1892. *Aclis supranitida*, Praeger, Proc. Roy. Irish Acad. [3], vol. ii, p. 262.
1892. *Aclis supranitida*, Locard, Coq. mar. Côtes de France, p. 138.
1893. *Aclis supranitida*, A. Bell, Proc. Roy. Phys. Soc. Edinb., vol. xii, p. 25.
1899. *Aclis supranitida*, Marshall, Journ. of Conch., vol. ix, p. 168.
1901. *Aclis minor*, var. *supranitida*, Conch. Soc. List, Journ. of Conch., vol. x, p. 19.
1901. *Aclis supranitida*, Brøgger, Norges geol. Undersøgelse, vol. xxxi, p. 661, pl. xix, fig. 11.
1905. *Aclis supranitida*, Kobelt, Icon. schalentrag. europ. Meeresconch., vol. iii, p. 55, pl. lxv, figs. 10, 11.

Specific Characters.—Shell larger than *A. ascaris* and somewhat more solid, generally with a less slender and elongated spire and a wider base; spiral ridges varying in number, sometimes obsolete; upper part of the whorls smooth, at other times slightly angulated by the first ridge.

Dimensions.—L. 5—6 mm. B. 2·5 mm.

Distribution.—Recent: British seas—Guernsey to the Hebrides. Ireland—Belfast, Dublin, Bantry Bay. From Norwegian coast and the Cattegat to Vigo Bay and Madeira, Mediterranean, Adriatic, Ægean.

Fossil: Coralline Crag: Sutton. Pleistocene: Largo Bay, Irish Estuarine clays, Liverpool docks.

Upper Pliocene: Altavilla. Pleistocene: Monte Pellegrino.

Remarks.—As stated above I think Wood has figured two forms, *A. supranitida* and *A. ascaris*. He calls each of them *A. supranitida*, expressly pointing out, it is true, in the tabular list appended to the second part of his 1st Supplement (p. 208), that he had not obtained *A. ascaris* in the Crag. Jeffreys states, however, that he had recognised both species in Wood's collection at the British Museum. It is not often that I prefer Jeffreys' opinion to that of my old friend, but I am inclined to do so in the present case.

Aclis Walleri (Jeffreys). Plate LXV, fig. 25.

1842—72. *Alvania albella*, S. V. Wood, Ann. Mag. Nat. Hist. [1], vol. ix, p. 534, 1842; *A. ascaris*, Mon. Crag Moll., pt. i, p. 99, pl. xii, fig. 11*c*, 1848; *A. albella*, 1st Suppl., p. 56, 1872.

1867—72. *Aclis Walleri*, Jeffreys, Brit. Conch., vol. iv, p. 105, 1867; vol. v, p. 210, pl. lxxii, fig. 4, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 141, 1872.
1872. *Aclis Walleri*, A. and R. Bell, Proc. Geol. Assoc., vol ii, p. 203.
1876. *Aclis Walleri*, Seguenza, Boll. R. Com. Geol. Ital., vol. vii, p. 96, no. 589.
1878. *Aclis Walleri*, G. O. Sars, Moll. Reg. Arct. Norv., pp. 196, 360, pl. xi, fig. 18.
1887. *Aclis Walleri*, Tryon, Man. Conch., vol. ix, p. 87, pl. xviii, fig. 65.
1890. *Aclis Walleri*, Carus, Prod. Faun. Medit., vol. ii, p. 296.
1897—99. *Aclis Walleri*, Locard, Exped. Trav. et Talism., vol. i, p. 434, 1897; Coq. mar. Côtes de France, p. 79, 1899.
1898. *Aclis Walleri*, Posselt, Medd. om Grönl., vol. xxiii, p. 221.
1899. *Aclis Walleri*, Marshall, Journ. of Conch., vol. ix, p. 168.
1901. *Aclis Walleri*, Friele og Greig, Norske Nordhav. Exped., vol. iii, p. 79.
1912. *Aclis Walleri*, var. *Sarsi*, Dautzenberg et Fischer, Camp. scient. Prince de Monaco, vol. xxxvii (Mollusques), p. 250, pl. x, figs. 31, 32.

Specific Characters.—Shell small, thin, transparent, elongato-conical; whorls 10, decidedly convex in the middle, smaller above and below; generally smooth or faintly striated; spire elevated, slender, with a deep suture and a bent apex; mouth short, roundish, acutely angulated above; outer lip slightly expanded, separated from the inner lip, which is nearly straight; umbilicus very narrow.

Dimensions.—L. 6 mm. B. 1·5 mm.

Distribution.—Recent: Dornoch Firth, W. Sutherlandshire; Shetland, Orkneys. Atlantic off Scilly in 690 fathoms.

Fossil: Coralline Crag: Sutton.

Remarks.—Two distinct forms have been described as *A. Walleri*, one by Jeffreys in 1869 (*op. cit.*), his name having been accepted by Wood in 1872 (Suppl. Crag Moll., pt. i, p. 56), the other by G. O. Sars,[1] Kobelt[2] and Dautzenberg,[3] the last acknowledging it to be different by calling it var. *Sarsi*, the essential difference between them being best shown by comparing the figures of those authors with that of Jeffreys. [The name of *A. Walleri* appears in the lists published by Seguenza and some others, but as in such cases no drawing has been given, it is impossible to decide to which shell they were alluding. Those given in this work by A. Bell and Marshall are Jeffreys' shell.]

Genus **PHASIANELLA**, Lamarck, 1804.

Phasianella pulla (Linné), var. **pulchella**, Récluz. Plate LXV, fig. 26.

1766. *Turbo pullus*, Linné, Syst. Nat., ed. xii, p. 2233.

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[1] Moll. Reg. Arct. Norv., pl. xi, fig. 18.
[2] Icon. schalentrag. europ. Meeresconch., vol. iii, pl. lxv, fig. 4.
[3] Camp. scient. Prince de Monaco, vol. xxxvii, pl. x, figs. 31, 32.

1803. *Turbo pullus*, Montagu, Test. Brit., pt. ii, p. 319.
1836—44. *Phasianella pulla*, Philippi, Enum. Moll. Sic., vol. i, p. 187, 1836; vol. ii, p. 158, 1844.
1853. *Phasianella pulla*, Forbes and Hanley, Brit. Moll., vol. ii, p. 538, pl. lxix, figs. 1—3.
1865—69. *Phasianella pulla*, Jeffreys, Brit. Conch., vol. iii, p. 338, 1867; vol. v, p. 204, pl. lxiv, fig. 1, 1869.
1871—98. *Phasianella pulla*, A. Bell, Ann. Mag. Nat. Hist. [4], vol. vii, p. 49, 1871; Rep. Brit. Assoc. (Leeds), p. 420, 1890; Rep. Yorks. Phil. Soc., p. 63, 1892; Trans. R. Geol. Soc. Cornwall, vol. xii, p. 154, 1898.
1874—76. *Phasianella pulla*, Seguenza, Boll. R. Com. Geol. Ital., vol. iv, p. 6, no. 427; p. 332, no. 145, 1874; vol. vii, p. 180, no. 711, 1876.
1887. *Phasianella (Tricolia) pulla* and var. *pulchella*, Récluz, Bucquoy, Dautzenberg et Dollfus, Moll. mar. Rouss., vol. i, pp. 337, 338, pl. xxxix, figs. 1—3.
1889. *Phasianella pulla*, Carus, Prod. Faun. Medit., vol. ii, p. 242.
1892. *Phasianella pulla*, Praeger, Proc. Roy. Irish Acad. [3], vol. ii, pp. 260, 276.
1892. *Phasianella pulla*, Locard, Coq. mar. Côtes de France, p. 194, fig. 170.
1901. *Phasianella pulla*, Conch. Soc. List, Journ. of Conch., vol. x, p. 17, no. 321.

Specific Characters.—Shell minute, ovato-conical, pointed at both ends; whorls 5–6, convex, the last much the largest, ornamented by oblique longitudinal coloured bands and a few closely-set transverse striæ, the latter invisible except under a microscope; spire short, rather abrupt; suture well defined; outer lip thin, incurved; inner lip reflected on the pillar.

Dimensions.—L. 4—6 mm. B. 3—4 mm.

Distribution.—Recent: British seas, principally south and west, from the Channel Islands to Oban and Mull, also on the Irish and Scotch coasts, extending southwards to the Mediterranean and the Canaries and south-eastwards to the Ægean and Black Sea.

Fossil: St. Erth. Selsey, Estuarine clays, Belfast. Holocene: Portrush.

Pliocene: Biot, Altavilla, Val d'Era.

Pleistocene: Messina, Ficarazzi, Monte Pellegrino, Taranto, Valle Biaia, Livorno.

Remarks.—This southern species has been recorded from St. Erth (where it is rare), from the Pleistocene of Selsey and the Belfast clays, as well as from the Holocene of Portrush, where it is very common, but it is unknown from any of the East Anglian deposits.

It seems to be a variable species, differing in size, form and ornament. The authors of the Mollusca of Roussillon describe or figure a dozen distinct varieties, those from Postrush, here represented, being smaller than the one they regard as the type (*op. cit.*, figs. 1—3), agreeing most nearly with *P. pulla*, var. *pulchella*, of Récluz (figs. 13—18), which the Portrush shell here figured seems to resemble most nearly.

Genus **PERINGIA**, Paladilhe, 1874.

Peringia compactilis (A. Bell). Plate LXV, fig. 20.

1893. *Hydrobia compactilis*, A. Bell, Rep. Yorks. Phil. Soc., 1893, pp. 63, 75, pl. i, fig. 18.

Specific Characters.—Shell minute, smooth, solid; whorls 6, but slightly convex, the last nearly two-thirds the total length, regularly diminishing towards an acute apex; spire conical; suture slight, rather oblique; mouth oval; angulated above, rounded below; outer lip thickened; inner lip thin, barely continuous; base rather patulous, imperforate.

Dimensions.—L. 2·5 mm. B. 2 mm.

Distribution.—Not known living.

Fossil: Selsey.

Remarks.—The specimen here given belongs to the York Museum,[1] where it bears the small red ticket indicating it was the original fossil from which the present species obtained its name. This is important, as it differs widely from the figure of *H. compactilis* published in Mr. Bell's original paper.

Peringia compacta, sp. nov. Plate LXV, fig. 21.

1884. *Hydrobia compacta, cf.*, Jeffreys, Proc. Zool. Soc. London, p. 128, pl. ix, fig. 9.
1898. *Hydrobia compacta*, A. Bell, Trans. Roy. Geol. Soc. Cornwall, vol. xii, p. 151.

Specific Characters.—Shell minute, solid, conical; whorls 6, flattened, smooth, the last obtusely angular, excavated below, about two-thirds of the total length; spire short, regularly tapering to a compressed apex; suture slight; mouth oval, angulate above, rounded below; peristome continuous; outer lip somewhat thickened, inner lip reflected on the pillar; base imperforate.

Dimensions.—L. 2·5 mm. B. 1 mm.

Distribution.—*Recent:* "Porcupine" Expedition—Atlantic, Tangier Bay.

Fossil: St. Erth.

Remarks.—The specimen from the British Museum (no. 18127) here figured was identified by Mr. A. Bell with Jeffreys' *Hydrobia compacta*. It differs from *Peringia ulvæ* in its imperforate base, and at the periphery, which the latter writer says is angular or keeled at all stages of its growth. Several dead specimens of the present form were obtained during the "Porcupine" Expedition off the Atlantic coast near Tangier.

[1] Unfortunately this specimen was broken in transit, but not before it had been photographed.

Peringia ulvæ (Pennant). Plate LXV, fig. 27.

1766. *Turbo ulvæ*, Pennant, Brit. Zool., vol. iv, p. 132, pl. lxxxvi, fig. 120.
1803. *Turbo ulvæ*, Montagu, Test. Brit., vol. ii, p. 318.
1848–72. *Paludestrina ulvæ*, S. V. Wood, Mon. Crag Moll., pt. i, p. 109, 1848; *Hydrobia ulvæ*, 1st Suppl., pt. i, p. 71, pl. iv, fig. 23, 1872.
1853. *Rissoa ulvæ* and vars., Forbes and Hanley, Brit. Moll., vol. iii, p. 141, pl. lxxxi, figs. 4, 5; pl. lxxxvii, figs. 2–8.
1859. *Rissoa ulvæ*, G. B. Sowerby, Ill. Ind. Brit. Shells, pl. xiii, fig. 3.
1863—71. *Rissoa ulvæ*, Jeffreys, Rep. Brit. Assoc. (Newcastle-on-Tyne), p. 78, 1863; Brit. Conch., vol. iv, p. 52, 1867; vol. v, p. 208, pl. lxix, fig. 1, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 488, 1871.
1872. *Hydrobia ulvæ*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, pp. 209, 216.
1874. *Peringia ulvæ*, Paladilhe, Ann. Sci. Nat., vol. iii, p. 14.
1878. *Hydrobia ulvæ*, G. O. Sars, Moll. Reg. Arct. Norv., p. 170, pl. xxii, fig. 2.
1885—9. *Hydrobia ulvæ*, Lorić, Arch. Mus. Teyler (2), vol. ii, p. 193, 1885; vol. iii, p. 123, 1887; Bull. Soc. Belge Géol., vol. iii (Mémoires), p. 431, 1889.
1890. *Hydrobia ulvæ*, Carus, Prod. Faun. Medit., vol. ii, p. 313.
1893. *Peringia ulvæ*, Locard, Coq. Eaux douces de France, p. 106, fig. 105.
1897. *Hydrobia ulvæ*, A. Bell, Trans. Roy. Geol. Soc. Cornwall, vol. xii, p. 151.
1897—1901. *Paludestrina stagnalis*, Kennard and B. B. Woodward, Essex Nat., vol. x, p. 108, 1897; vol. xi, p. 217, 1900; Proc. Malac. Soc., vol. iii, pp. 197 *et seq.*, 1899; Proc. Geol. Assoc., vol. xvii, pp. 244 *et seq.*, 1901.
1901. *Hydrobia ulvæ*, Brøgger, Norges geol. Undersøgelse, vol. xxxi, pp. 380, 657, pl. v, fig. 15.
1902. *Paludestrina stagnalis*, Conch. Soc. List, Journ. Conch., vol. x, p. 18.
1911. *Peringia ulvæ*, Dollfus, Journ. de Conch., vol. lix, p. 209, fig. 9; p. 243, pl. iv, figs. 1—4.

Specific Characters.—Shell small, rather solid, oblong; whorls 7—8, compressed, the last obtusely angulate, about half the total length; spire tapering; apex blunt; suture slight but well-marked; mouth oval, angulate above; inner tip reflected on the pillar and over the base of the shell, with a small umbilical chink behind it; peristome continuous.

Dimensions.—L. 8 mm. B. 4 mm.

Distribution.—Recent: Great Britain and Ireland, very abundant in tidal estuaries, rivers and bays. Mediterranean, Atlantic coast, from Spain northwards to Finmark and the Lofoten Islands. Baltic Sea, Pacific coast of North America.

Fossil: St. Erth. Waltonian Crag: Walton-on-Naze. Icenian: Bramerton, Postwick, Aldeby, Yarn Hill, Beccles, Dunwich, Thorpe—Suffolk.

Pleistocene: Billockby, Speeton, Clacton, Copford, Grays, Ilford, March. Nar brick-earth. Gedgrave. Clyde beds.

Lower Pliocene (*Congeria*-beds): Mauer near Vienna, Bizenz in Moravia. Amstelien: Goes, Amsterdam.

Pleistocene: Uddevalla, *Isocardia*- and *Tapes*-bank, Christiania, Trondhjem (Øyen). Ermien: Holland, Vallée Gueldroise.

Remarks.—For a long time the present species has been known to conchologists

by Pennant's specific name of *ulvæ*. Some few years ago, however, under the impression that it was identical with the *Turbo stagnalis* of Baster, the latter name was substituted for it in the list of British Marine Mollusca issued by the Conchological Society of Great Britain. The further light thrown on the subject (see p. 18) seems to indicate that the identification of these two species was incorrect and that the old name should be revived.

Formerly it was grouped with *Hydrobia*, somewhat later with *Paludestrina*. M. Dollfus, however, has more recently referred it to the genus *Peringia* of Paladilhe. *P. ulvæ* is unknown in the earlier horizons of the Crag, making its first appearance at the Icenian stage, in which it has been reported from a number of localities, being found also in the Pleistocene deposits both here and abroad. It occurs, moreover, in the salt-water estuaries of East Anglia as on the mud flats of the River Alde above Orford in Suffolk, where it may be observed in countless profusion.

Genus **LITTORINA**, Férussac, 1821 (*continued from Vol. II, p.* 645).

Littorina rudis (Maton), var. **saxatilis** (Olivi). Plate LXV, fig. 28.

1912. *Littorina saxatilis*, Dautzenberg et Fischer, Camp. Scient. Prince de Monaco, vol. xxxvii (Mollusques), p. 192, pl. ix, figs. 1, 2, 3.
1921. *Littorina rudis*, var. *saxatilis*, F. W. Harmer, Pliocene Moll. Gt. Britain, vol. ii, p. 655.

Remarks.—Since writing the short notice of this shell (*supra*, p. 655), I have received from my friend Mons. Dautzenberg several specimens of what he considers the typical form of it, which he has figured in the work named above, figs. 1, 2, 3. They were obtained at Venice from the Canal d'Arsenal. He regards the colour as well as the comparative size as among the special characteristics of this variety. It is by no means an abundant form in the English Crag.

Var. **rudissima**, Bean. Plate LXV, figs. 29, 30.

1921. *Littorina rudis*, var. *rudissima*, F. W. Harmer, Plioc. Moll. Gt. Brit., vol. ii, p. 657, pl. liii, figs. 10, 11.

Remarks.—Among the specimens of this variety received from M. Dautzenberg is a form (fig. 30) with a shorter spire than those described by me on a former occasion (*q. v.*), which is well represented by the one from Bramerton now figured. They both show the fine, closely-set spiral ridges characteristic of this shell. This variety is not so common, however, in the English Crag (Icenian) as the var. *lævis*.

Genus **ACMÆA**, Eschscholtz.

Acmæa virginea (Müller). Plate LXV, fig. 31.

1776—78. *Patella virginea*, Müller, Zool. Dan. Prod., vol. vii, p. 43, no. 2867, 1776; Zool. Dan., vol. i, p. 13, pl. xii, figs. 4, 5, 1778.
1790. *Patella virginea*, Gmelin, Linné, Syst. Nat., ed. xiii, p. 3711.
1848—72. *Tectura virginea*, Wood, Mon. Crag Moll., pt. i, p. 161, pl. xviii, fig. 6, 1848; 1st Suppl., p. 211, 1872.
1853. *Acmæa virginea*, Forbes and Hanley, Brit. Moll., vol. ii, p. 437, pl. lxi, figs. 1, 2.
1859. *Acmæa virginea*, G. B. Sowerby, Ill. Ind. Brit. Shells, pl. x, fig. 23.
1865—82. *Tectura virginea*, Jeffreys, Brit. Conch., vol. iii, p. 248, 1865; vol. v, p. 200, pl. lviii, fig. 4, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 491, 1871; Proc. Zool. Soc., p. 671, 1882.
1871—98. *Tectura virginea*, A. Bell, Geol. Mag., vol. viii, p. 454, 1871; Proc. Roy. Phys. Soc. Edin., vol. x, pp. 292, 296, 1896; Rep. Brit. Assoc. (Leeds), pp. 417, 420, 1890; Proc. Roy. Irish Acad. [3], vol. ii, p. 631, 1893; Trans. Roy. Geol. Soc. Cornwall, vol. xii, p. 156, 1898.
1872. *Tectura virginia*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, pp. 210, 214.
1874—76. *Tectura virginea*, Seguenza, Boll. R. Com. Geol. Ital., vol. v, p. 12, no. 510; p. 334, no. 178, 1874; vol. vii, p. 264, no. 824, 1876.
1878. *Tectura virginea*, G. O. Sars, Moll. Reg. Arct. Norv., pp. 121, 357.
1886. *Acmæa virginea*, Bucquoy, Dautzenberg et Dollfus, Moll. mar. Rouss., vol. i, p. 478, pl. li, figs. 12, 13.
1889. *Tectura virginea*, Carus, Prod. Faun. Medit., p. 233.
1892. *Tectura virginea*, A. Bell, Rep. Yorks. Phil. Soc., pp. 63, 71.
1892. *Tectura virginea*, Locard, Coq. mar. Côtes de France, p. 231, fig. 208.
1892. *Tectura virginea*, Praeger, Proc. Roy. Irish Acad. [3], vol. ii, p. 258.
1901. *Tectura virginea*, Brøgger, Norges geol. Undersøgelse, vol. xxxi, pp. 539, 657, pl. vi, fig. 28.
1901. *Acmæa virginea*, Mayfield, Norfolk mar. Moll., Journ. of Conch., vol. x, p. 50.
1901. *Acmæa virginea*, Conch. Soc. List, Journ. of Conch., vol. x, p. xvi, no. 278.
1910–12. *Acmæa virginea*, Odhner, Arkiv f. Zool., vol. vii, p. 23, 1910; K. Svensk. Vet.-Akad. Handl., vol. xlviii, p. 24, pl. i, figs. 9—12, 1912.
1912. *Acmæa virginea*, Dautzenberg et Fischer, Camp. scient. Prince de Monaco, vol. xxxvii (Mollusques), p. 292.
1920. *Tectura virginea*, Bardarson, K. Dansk. Vidensk. Selsk., Biol. Medd., vol. ii, pp. 80, 119.

Specific Characters.—Shell small, fairly solid, opaque, generally patelliform, sometimes depressed, ornamented by numerous fine thread-like lines, often inconspicuous and in some specimens from the Crag wanting, with concentric striæ and marks of growth; beak sharp, placed nearest to the anterior end; aperture round to oval, margin bevelled, smooth inside, polished; in the variety *conica* (fig. 32) the shell is smaller and more conical, with the crown higher and nearly central.

Dimensions.—L. 9—14 mm. B. 7—12 mm. H. 5—9 mm.

Distribution.—Recent: Abundant on the British coasts on shells and stones in the laminarian zone and sometimes at low water. The variety *conica*, Wood, occurs in deeper water, north Atlantic from Iceland, Finmark and Norway to the

Straits of Gibraltar, Madeira, the Azores, the Canary Isles, Cape Verde Islands and St. Helena. Mediterranean, Adriatic, Ægean.

Fossil: Coralline Crag: Gedgrave, Sutton. Waltonian: Little Oakley. Newbournian: *passim*. Butleyan: Bawdsey, Butley. Icenian: Bramerton, West Runton.

Pleistocene: Selsey, Kelsey Hill, Barnstaple, Portland, Torbay, Bridgewater, Isle of Man, Wexford, Portrush, Largo Bay, raised beaches of south of England, Scotland, estuarine clays of Ireland.

Miocene: Italy (Pouzi, *fide* Jeffreys).

Pliocene: France, Belgium, Italy.

Pleistocene: Uddevalla, Christiania Fiord from *Cyprina*-beds to *Tapes*-banks. Italy—Calabria, Taranto, Reggio, Tuscany. Sicily. Mount Etna, Monte Pellegrino.

Remarks.—Two varieties of this small fossil were known to Wood from three localities only in the Crag, one the normal form with a depressed apex about half as high as the length of the shell, and another which he distinguished as var. *conica* having a smaller and semicircular base, and a higher and a more central apex. I have obtained a fair number of specimens from Oakley, nearly all of them of the first sort but most too worn to show the distinguishing sculpture distinctly. Dr. Nordmann, however, has kindly sent me several, perfect, for comparison.

As a recent shell *T. virginea* is a common British form, the var. *conica* being characteristic of deeper water. The type (fig. 31) has rather a wide range abroad, both as recent and fossil.

Var **conica**, S. V. Wood. Plate LXV, fig. 32.

1848. *Tectura virginea*, var. *conica*, S. V. Wood, Mon. Crag Moll., vol. i, p. 161, pl. xviii, fig. 64*a*.
1865. *Tectura virginea*, var. *conica*, Jeffreys, Brit. Conch., vol. iii, p. 249.
1886. *Tectura virginea*, var. *conica*, Bucquoy, Dautzenberg et Dollfus, Moll. mar. Rouss., vol. p. 480.

Varietal Characters.—Shell generally smaller than the type, more conical, with the crown higher and somewhat more nearly central.

Distribution.—Recent: British Isles, in deeper water.

Fossil: Waltonian Crag of Little Oakley and elsewhere; fairly common, but not so much so as the type form.

Genus **LEPETA**, Gray, 1847.

Lepeta cæca (Müller). Plate LXV, figs. 33, 34.

1776. *Patella cæca*, Müller, Zool. Dan., p. 237.
1841—70. *Patella candida*, Gould, Rep. Inv. Mass., ed. 1, p. 152, 1841; *Lepeta cæca*, ed. 2, p. 270, fig. 531, 1870.

1842. *Patella cerea*, Möller, Ind. Moll. Grönl., p. 16.
1863—71. *Lepeta cæca*, Jeffreys, Rep. Brit. Assoc. (Newcastle-on-Tyne), p. 77, 1863; Brit. Conch., vol. iii, p. 252, 1865; vol. v, p. 200, pl. lviii, fig. 6, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 488, 1871.
1869. *Lepeta cæca*, Mörch, Ann. Soc. Mal. Belge, vol. iv (Mémoires), p. 22.
1870—1917. *Lepeta cæca*, A. Bell, Ann. Mag. Nat. Hist. [4], vol. vi, p. 216, 1870; Journ. Ipswich Field Club, vol. iii, p. 15, 1911; Yorks. Natur., p. 96, 1917.
1872. *Lepeta cæca*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, pp. 203, 209, 213.
1872. *Lepeta cæca*, Dawson, Canad. Nat. (N.S.), vol. vi, p. 324, pl. vi, fig. 2.
1878. *Lepeta cæca*, G. O. Sars, Moll. Reg. Arct. Norv., pp. 123, 357, pl. xx, fig. 17.
1892. *Lepeta cæca*, Van den Broeck, Bull. Soc. Belge Géol., vol. vi (Mémoires), p. 134.
1896. *Lepeta cæca*, Bernays, Bull. Soc. Belge Géol., vol. x (Mémoires), p. 132.
1898. *Lepeta cæca*, Posselt, Medd. om Grönl., vol. xxiii, p. 117.
1900. *Lepeta cæca*, Conch. Soc. List, Journ. of Conch., vol. x, p. 19, no. 279.
1901. *Lepeta cæca*, Brøgger, Norges geol. Undersøgelse, vol. xxxi, p. 653, pl. i, fig. 7.
1910—15. *Lepeta cæca*, Odhner, Arkiv f. Zool., vol. vii, p. 4, 1910; K. Svensk. Vet.-Akad. Handl., vol. xlviii, p. 32, pl. ii, figs. 2—17, 1912; vol. liv, p. 140, 1915.
1912. *Lepeta cæca*, Dautzenberg et Fischer, Camp. scient. Prince de Monaco, vol. xxxvii (Mollusca), p. 300.
1915. *Lepeta cæca*, Johnson, Bost. Soc. Nat. Hist., Occ. Papers, vol. vii, Fauna of New England, no. 13 (Mollusca), p. 86.
1920. *Lepeta cæca*, Bardarson, K. Danske Vidensk. Selsk., Biol. Medd., vol. ii, pp. 81, 119, 125.

Specific Characters.—Shell oval, larger and wider in proportion than *L. fulva*; fairly solid; ornamented by numerous very fine closely-set radiating lines, crossed by still finer concentric striæ, causing slight tuberculation at the intersections, with clearly-marked lines of growth; beak blunt, nearly central, erect, often worn; mouth oval, margin thin; central scar large and conspicuous; pallial scar rather broad, placed between the latter and the margin.

Dimensions.—L. 5—8 mm. B. 4—6 mm.

Distribution.—Recent: Shetland Isles—Unst. Norwegian coast from Finmark and the Lofoten Islands to the Christiania fiord; Sweden; northern regions from the Sea of Okhotsk to Spitzbergen, Iceland. Greenland and the New England coast. Eastern and western coasts of North America.

Fossil: Coralline Crag: Sutton.

Pleistocene: Bridlington, Moray Firth, Uddevalla, Christiania Fiord—nearly all zones, from the older *Arca*-beds to the upper *Tapes*-banks. Labrador. Canada—Montreal, Quebec, Riviére du Loup.

Remarks.—This species has a wide circumpolar range as a recent shell. Up to 1879 it seems to have been unknown to Wood as a British fossil, as there is no mention of it in his Monograph of 1848 or in his 1st or 2nd Supplements of 1872 and 1879. In the collection of Crag shells, however, presented by Mrs. Wood in 1885 to the Norwich Museum there is a specimen bearing in the writing of Wood *père* the name *Lepeta cæca*.

Lepeta fulva (Müller). Plate LXV, figs. 35, 36.

1773. *Patella fulva*, Müller, Zool. Dan. Prod., p. 237, pl. xxiv, figs. 1—3.
1843. *Tectura fulva*, S. V. Wood, Mon. Crag Moll., pt. i, p. 161, pl. xviii, fig. 7.
1853. *Pilidium fulvum*, Forbes and Hanley, Brit. Moll., vol. ii, p. 441, pl. lxii, figs. 6, 7.
1859. *Pilidium fulvum*, G. B. Sowerby, Ill. Ind. Brit. Shells, pl. x, fig. 24.
1865—82. *Tectura fulva*, Jeffreys, Brit. Conch., vol. iii, p. 250, 1865; vol. v, pl. lviii, fig. 5, 1869; in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 145, 1871; Proc. Zool. Soc., p. 671, 1882.
1878. *Scutellina fulva*, G. O. Sars, Moll. Reg. Arct. Norv., pp. 122, 357.
1901. *Scutellina fulva*, Brøgger, Norges geol. Undersøgelse, vol. xxxi, p. 657, pl. xvi, fig. 7.
1901. *Lepeta fulva*, Conch. Soc. List, Journ. of Conch., vol. x, p. 16, no. 280.
1912. *Pilidium fulvum*, Odhner, K. Svensk. Vet.-Akad. Handl., vol. xlviii, p. 12, pl. ii, figs. 18—23.

Specific Characters.—Shell small, semi-oval, thin, depressed, ornamented by exceedingly fine radiating striæ, minutely beaded, with concentric lines close-set and imbricated; beak nearer the anterior end; base ovate, narrower on the anterior portion; mouth oval; margin very thin, slightly scalloped by the ribs; inside glossy; central scar forming a semicircular lobe in front and an oval one behind.

Dimensions.—L. 8 mm. B. 7 mm. H. 3 mm.

Distribution.—Recent: Scotland—on many parts of the west coast; Moray Firth, Aberdeenshire, Shetland; Ireland—Cork, Youghall, Cape Clear, west coast.

Coasts of Norway, Sweden and Denmark, Finmark and Lofoten Islands to the Christiania Fiord. Bay of Biscay, Tripoli, Sicily.

Fossil: Coralline Crag: Sutton. Waltonian: Walton-on-Naze, Little Oakley. Newbournian: Brightwell. Butleyan: Bawdsey. Christiania Fiord—*Ostrea*-beds to *Tapes*-banks.

Remarks.—This species has mainly a Scandinavian, Scotch and Irish range, though an occasional specimen has been met with as far south as the Bay of Biscay or the Mediterranean. It is rather rare in the English Crag. The delicate tuberculation of the radiating lines seems a distinguishing feature. Wood found it to be by no means rare in the Coralline Crag. There seems to have been some difference of opinion as to its generic position, Wood and Jeffreys referring it to *Tectura*, the British Conchological Society to *Lepeta*, and others to *Pilidium* or *Scutellina*.

My collections do not indicate that the present species is anything but rare in the English Crag. Wood says, however, that it is by no means so at the Coralline horizon, and in the collections handed over to the writer at the death of the younger Wood there were several specimens labelled *T. fulva*. It has been reported from Oakley from time to time, and would probably repay a further search at that locality. It has not been sufficiently worked out in the later beds of the Red Crag. I have figured one example obtained from Oakley. My Crag shells compare very

satisfactorily with some recent ones which Dr. Nordgaard was kind enough to send me from Denmark and Norway for comparison.

Genus **PALUDESTRINA**, D'Orbigny, 1839.

Paludestrina proventrosa, A. Bell, MS. Plate LXV, fig. 19.

Specific Characters.—Shell elongato-conical, thin; whorls 6—7, slightly convex, the last about half the total length; spire regularly diminishing to a small, blunted point; suture well marked; mouth oval, angulate above, rounded below; outer lip thin; inner lip separated from the columella; umbilical chink very small.

Dimensions.—L. 5 mm. B. 2 mm.

Distribution.—Not known living.

Fossil: Beccles boring.

Remarks.—The shell now figured was discovered by Mr. A. Bell in the Crowfoot Collection at the Norwich Museum, having been obtained from the Beccles waterworks boring. He has separated it from *H. ventrosa* under the name of *H. proventrosa*. The former is an estuarine shell living under conditions in which the admixture of fresh water predominates over salt.

Paludestrina Reevei (S. V. Wood, Jr.). Plate LXV, fig. 37.

1882. *Odostomia Reevei*, S. V. Wood, Jr., Mon. Crag Moll., 3rd Suppl., p. 9, pl. i, fig. 12.
1899. *Paludestrina Reevei*, Kennard and B. B. Woodward, Proc. Malac. Soc., vol. iii, p. 198, fig. 2.
1914. *Paludestrina Reevei*, F. W. Harmer, Plioc. Moll. Gt. Brit., vol. i, p. 34.

Specific Characters.—Shell minute, ovato-conical; apex very obtuse, base obliquely rimate; whorls 4, slightly convex, smooth, the last about two-thirds the total length; mouth oval, oblique, acutely angulate above; peristome simple, continuous; columella nearly straight, somewhat reflexed.

Dimensions.—L. 2 mm. B. 1 mm.

Distribution.—Not known living.

Fossil: Icenian Crag: Bramerton (Blake's pit).

Remarks.—This minute shell, originally identified by S. V. Wood as the *Bithynia obtusa* of Sandberger, was shown in 1899 by Messrs. Kennard and B. B. Woodward to be a different species (*loc. cit.*), and called by them *P. Reevei*, after the late Curator of the Norwich Museum, whose work on the Bramerton Crag will be held in lasting remembrance, while his skill and patience as a collector is evidenced by the many beautifully perfect specimens preserved in his well-known collection. Meanwhile, however, Reeve's shell was figured by the younger Wood

in 1882 in the 3rd Supplement to his father's Monograph, under the name proposed by Messrs. Kennard and Woodward, but the artist's figure was not a very fortunate one. The type specimen is, however, preserved in the Norwich Museum and is here reproduced. In my reference to the matter in 1914 (*op. cit.*, p. 34) I was clearly mistaken in adopting the then prevailing opinion that the Crag shell was identical with Sandberger's species.

Paludestrina minuta (S. Woodward). Plate LXV, fig. 38.

1833. *Turbo minutus*, S. Woodward, Geol. Norf., p. 44, pl. iii, fig. 20.
1842—72. *Rissoa subumbilicata*, S. V. Wood, Ann. Mag. Nat. Hist. [1], vol. ix, p. 533, 1842; *Paludestrina subumbilicata*, Mon. Crag Moll., pt. i, p. 108, pl. xi, fig. 2, 1848; *Hydrobia subumbilicata*, 1st Suppl., pt. i, p. 71, 1872.
1859. *Rissoa ulvæ*, var. *subumbilicata*, G. B. Sowerby, Ill. Ind. Brit. Shells, pl. xiii, fig. 3*x*.
1871. *Hydrobia ventrosa*, Jeffreys, in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 493.
1871. *Hydrobia ulvæ*, var. *subumbilicata*, A. Bell, Ann. Mag. Nat. Hist. [4], vol. vii, p. 360.
1872. *Hydrobia subumbilicata*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, p. 219.
1890. *Hydrobia subumbilicata*, C. Reid, Plioc. Dep. Brit., p. 245.
1899. *Paludestrina ventrosa*, Kennard and B. B. Woodward, Proc. Malac. Soc., vol. iii, p. 197.

Specific Characters.—Shell minute, conical, smooth; whorls 5, convex, the last tumid, much the largest; spire elevated; suture deep and well defined; apex obtuse; mouth ovate, angulate above; peritreme continuous; inner lip reflected; umbilicus small.

Dimensions.—H. 3·5 mm. B. 2·5 mm.

Distribution.—Not known living.

Fossil: St. Erth. Waltonian Crag: Walton-on-Naze. Newbournian: Felixstowe. Butleyan: Butley. Icenian: Bramerton.

Miocene: Wiesbaden, Touraine.

Upper Pliocene (*Congeria*-beds): Mauer, near Vienna, Bizenz in Moravia, and elsewhere.

Remarks.—This shell has long been known by Montagu's specific name of *subumbilicata*, but I do not think it can be identified satisfactorily with that species, the type from which the latter was described having been in all probability a recent specimen picked up, as its author informs us, on the beach at Weymouth. The Crag shell, on the contrary, is an extinct form, reported from the Miocene of Germany and Touraine and from the German Pliocene.

It is, I have little doubt, the Bramerton fossil described by Samuel Woodward in 1833 as *Turbo minutus*, as to which he says it was "found in the large Murices," by which name the Crag *Neptuneas* were at that time known. Most of the specimens of *Paludestrina* collected at Bramerton by Mr. Jas. Reeve were obtained in this way.

Our shell is not the *Turbo minutus* of Totten.

Paludestrina stagnalis (Baster). Plate LXV, fig. 39.

1765. *Turbo stagnalis*, Baster, Opus Subsec., vol. ii, p. 77, pl. viii, fig. 4.
1766. *Helix stagnalis*, Linné, Syst. Nat., vol. xii, p. 1248, no. 697, non 703.
1803. *Turbo ventrosus*, Montagu, Test. Brit., pt. ii, p. 317, pl. xii, fig. 13.
1853. *Rissoa ventrosa*, Forbes and Hanley, Brit. Moll., vol. iii, p. 138, pl. lxxxvii, figs. 5—7.
1862—9. *Hydrobia ventrosa*, Jeffreys, Brit. Conch., vol. i, p. 66, 1862; vol. v, p. 151, pl. iv, fig. 7, 1869.
1878. *Hydrobia minuta*, G. O. Sars, Moll. Reg. Arct. Norv., p. 171, pl. ix, fig. 11.
1890. *Hydrobia ventrosa*, Carus, Prod. Faun. Medit., vol. ii, p. 314.
1897—1901. *Paludestrina ventrosa*, Kennard and B. B. Woodward, Essex Nat., vol. x, pp. 92 *et seq.*, 1897; Proc. Malac. Soc., vol. viii, p. 197, 1899 ; Proc. Geol. Assoc., vol. xvii, pp. 235 *et seq.*, 1901.
1911. *Hydrobia stagnalis*, Dollfus, Journ. de Conch., vol. lix, p. 234, pl. v, figs. 1–4.

Specific Characters.—Shell minute, much smaller and more fragile than *P. ulvæ*; whorls 6—7, convex and rounded; suture deep; mouth oval, angulate above; peristome continuous; outer lip thin, slightly reflected; umbilical chink small.

Dimensions.—L. 3—4 mm. B. 1·5—2 mm.

Distribution.—Recent: Abundant throughout England and Wales, in some estuaries and in brackish water where the admixture of fresh predominates over salt; also in Larne Lough, Ireland, as well as in similar situations along the sea coasts of Sweden, France and Portugal. Mediterranean—Algiers, French coast, Adriatic, Dalmatia. Holland.—Kaasjeswater near Zierikzee.

Fossil: Waltonian Crag: Walton-on-Naze (A. Bell). Newbournian: Felixstowe. Butleyan: Butley. Icenian: Norwich zone—Bramerton (very abundant), Beccles, Yarn Hill. Weybourn zone—West Runton. St. Erth.

Pleistocene: Selsey; Largo Bay; widely distributed in the Pleistocene and Holocene of the south and east of England; abundant in the estuarine clays of north-east Ireland.

Miocene: Touraine, Wiesbaden.

Lower Miocene: *Congeria*-beds, Mauer near Vienna. Bizenz in Moravia and elsewhere (K. and B. B. W.).

Remarks.—There seems considerable difference of opinion as to the correct nomenclature, whether generic or specific, of the little shells described in the following paragraphs, the one now given as *Paludestrina stagnalis* having been known, for example, to Montagu as *Turbo ventrosus*, to Jeffreys as *Hydrobia ventrosa*, to G. O. Sars as *Hydrobia minuta*, to Kennard and B. B. Woodward as *Paludestrina ventrosa*, and to Dollfus as *Hydrobia stagnalis*.

In 1912 M. Dollfus gave his views on the subject at considerable length, and may claim, I think, to have established the fact that the *Turbo stagnalis* of Baster (1765) and the *T. ventrosus* of Montagu (1803) were the same; it appears that in his 12th edition Linné described two distinct species as *Helix stagnalis*, one being

Baster's shell, the other a well-known and quite different form of *Helix* (*H. stagnalis*).

Baster's type specimens seem to have been obtained from the Kaasjes water, a brackish-water lagoon near Ziricœa (Zierikzee) in Holland, a locality which can be definitely identified, having been examined in 1896 by Dr. Lorié, who obtained from it a number of examples which proved to be identical with the *T. ventrosus* of Montagu, two of them being figured by M. Dollfus together with two of Montagu's recent shells to show they were the same.[1]

P. stagnalis is a smaller and more distinctly brackish-water form than *P. ulvæ*. While Jeffreys described the latter among the native shells of Great Britain, he placed the former under the name of *Hydrobia ventrosa* with the freshwater mollusca, stating it is usually found in ponds or ditches into which the water flows only at high tide, and the fresh water predominates over the salt. In connection with this it may be interesting to notice that though *P. ulvæ* occurs only occasionally in the Icenian Crag, a form allied to *P. stagnalis* (*P. minuta*), described below, is found there at certain localities in great profusion. This may support the view I have taken in vol. i, p. 413, that the Icenian Sea or Lake was one of comparatively low salinity.

As M. Dollfus identifies Baster's Dutch shell with the Crag *P. minuta* (*subumbilicata* of Wood), it seems desirable to figure a specimen of the former for comparison.

In his original description of *T. stagnalis* Baster remarked that this animal loves to float on the surface of the water, with its foot turned upwards as if sunning itself. The late Mr. E. A. Smith informed me that the British *P. ventrosa* has a similar habit, but that *P. ulvæ* crawls on the bottom and does not swim or float. In a letter received from him, dated July 9th, 1915, he expressed the opinion that Dr. Lorié's specimens show M. Dollfus was right in uniting *P. stagnalis* and *P. ventrosa*, and that, Baster's name being the oldest, it should be adopted. I believe Mr. Kennard has come to the same conclusion.

Genus **PHERUSA**, Jeffreys, 1869.

Pherusa Gulsonæ (Clark). Plate LXV, fig. 40.

1850—51. *Chemnitzia Gulsonæ*, Clark, Ann. Mag. Nat. Hist. [2], vol. vi, p. 459, 1850; vol. viii, p. 108, 1851.

1853. *Odostomia Gulsonæ*, Forbes and Hanley, Brit. Moll., vol. iv (appendix), p. 281, pl. cxxxii, fig. 6.

1867—84. *Aclis Gulsonæ*, Jeffreys, Brit. Conch., vol. iv, p. 106, 1867; vol. v, *Menippe Gulsonæ*, p. 107, 1867; *Pherusa Gulsonæ*, vol. v, p. 210, pl. lxxii, fig. 5, 1869; *Aclis Gulsonæ*, in Prestwich, Quart. Journ. Geol. Soc., vol. xxvii, p. 141, 1871; Proc. Zool. Soc., p. 344, 1884.

[1] Since the above was written Dr. Lorié has very kindly made a special visit to the Zierikzee to obtain a fresh supply of specimens, one of which is now figured. He informs me they still exist there in great profusion.

1872. *Odostomia Gulsonæ*, S. V. Wood, Mon. Crag Moll., 1st Suppl., p. 62, pl. iv, fig. 26.
1872. *Aclis Gulsonæ*, A. and R. Bell, Proc. Geol. Assoc., vol. ii, p. 203.
1876. *Aclis Gulsonæ*, Seguenza, Boll. R. Com. Geol. Ital., vol. vii, p. 96, no. 591.
1890. *Aclis Gulsonæ*, Carus, Prod. Faun. Medit., vol. ii, p. 296.
1892. *Pherusa Gulsonæ*, Locard, Coq. mar. Côtes de France, p. 156, fig. 134.
1899. *Pherusa Gulsonæ*, Marshall, Journ. of Conch., vol. ix, p. 169.
1901. *Pherusina Gulsonæ*, Conch. Soc. List, Journ. of Conch., vol. x, p. 20, no. 418.

Specific Characters.—Shell minute, smooth, slender; whorls 6—7, convex, the last much the largest; spire elongate, subcylindrical, gradually tapering to a blunt, introverted point; suture deep, rather oblique; mouth subcircular, pointed below; outer lip expanded; inner lip not united with it.

Dimensions.—L. 2 mm. B. 1 mm.

Distribution.—*Recent:* British coasts, coralline zone, Land's End and Guernsey to Shetland and Skye. Mediterranean, Vigo Bay, Madeira.

Fossil: Coralline Crag: Sutton. Red Crag: Walton-on-Naze. Upper Pliocene: Messina.

Remarks.—This small shell was known to Wood as a fossil from the Coralline Crag of Sutton only, but I have a specimen in my own collection from Walton which I obtained with some others from Damon's sale.

It has been formerly grouped with *Chemnitzia*, *Odostomia* or *Aclis* by the authors quoted above, but is now generally referred to the *Pherusa* of Jeffreys, who has adopted the present species as the type of the genus in question.

Pherusa conica, A. Bell, MS. Plate LXV, fig. 41.

Specific Characters.—Shell minute, solid, smooth and polished, conical; whorls 4, but slightly convex, the last angulated three-fifths the total length; spire short, with a blunt, intorted apex; suture well marked; mouth ovate, rather wide; outer and inner lips disunited.

Dimensions.—L. 2·5 mm. B. 1·5 mm.

Distribution.—Not known living.

Fossil: St. Erth.

Remarks.—The fossils figured under this name (B.M. no. G.18081) and under that of the two next paragraphs were obtained by Mr. A. Bell at St. Erth and referred to the genus *Pherusa* of Jeffreys. None of these have been recognised from any other locality, either British or foreign. The mollusca of St. Erth seem to form a group in many ways *sui generis*.

Pherusa lævis, A. Bell, MS. Plate LXV, fig. 42.

Specific Characters.—Shell minute, solid, smooth and polished; whorls 5, but little convex, the last obtusely keeled at the periphery, more than half the total

length; spire elongate, slender, regularly diminishing to a blunt, intorted apex; suture well marked; mouth narrow, pointed above and below; outer and inner lips discontinuous.

Dimensions.—L. 3 mm. B. 1 mm.

Distribution.—Not known living.

Fossil: St. Erth.

Remarks.—The shell now figured approaches *P. eulimoides* in its elongated spire, but the latter is distinctly shorter and more slender than it is in that species. I give it under the name originally proposed for it by Mr. A. Bell. The specimen here represented belongs to the British Museum of Natural History, where it is numbered G. 18080.

Pherusa eulimoides, A. Bell, MS. Plate LXV, fig. 43.

Specific Characters.—Shell minute, slender, smooth; whorls 5, flattened, the last more than half the total length, obtusely keeled; spire elongate, regularly diminishing to a blunt point; mouth long, very narrow, angulate and pointed above and below; outer lip not expanded; inner lip straight, separated from the former.

Dimensions.—L. 3 mm. B. 1 mm.

Distribution.—Not known living.

Fossil: St. Erth.

Remarks.—This minute and delicate shell is represented by a unique specimen obtained by Mr. Bell from St. Erth. Although presenting the usual characteristics of this genus, it is clearly distinguished from the other *Pherusas* from that deposit here described by its longer and exceedingly narrow spire.

INDEX.

NOTE.—The names of genera, sub-genera, species and varieties adopted in the Monograph, with the essential page-references, are printed in thick type. The Roman numeral and the following Arabic numerals in brackets indicate the plate and figures of those species and varieties which are illustrated.

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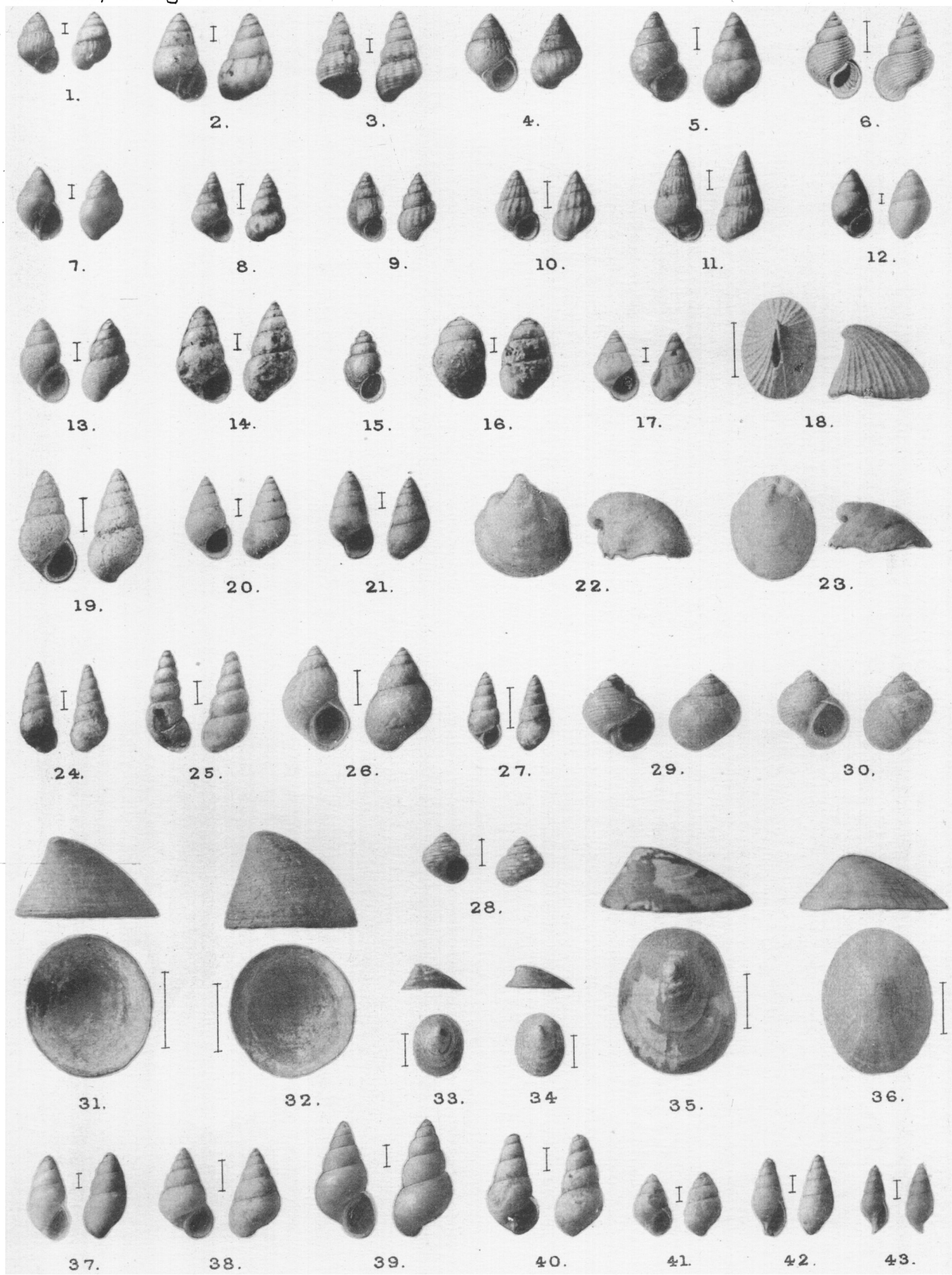
PLATE LXV.

Harmer, Crag Mollusca.

PLATE LXV.



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