

COTTUS SCORPIUS, *Linn.* Short-spined Sea Bullhead.

I captured a fine and highly coloured example of this Bullhead in a rock-pool at North Berwick on the 20th of August 1894. This specimen was 10.87 inches in length, and weighed 328 grammes = 11.55 ozs. The head and sides, above the lateral line, were beautifully and plentifully variegated with bright pink; the pectoral and anal fins were broadly margined with rich orange, and the bars on the caudal fin were also of this last-named tint.

GASTEROSTEUS SPINACHIA, *Linn.* Fifteen-spined Stickleback.

A particularly large specimen, captured in a rock-pool at North Berwick on the 27th of August 1894, was 7.57 inches in length and weighed 16.3 grammes = .57 oz.

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## ON NEW AND RARE SPECIES OF COPEPODA FROM SCOTLAND.

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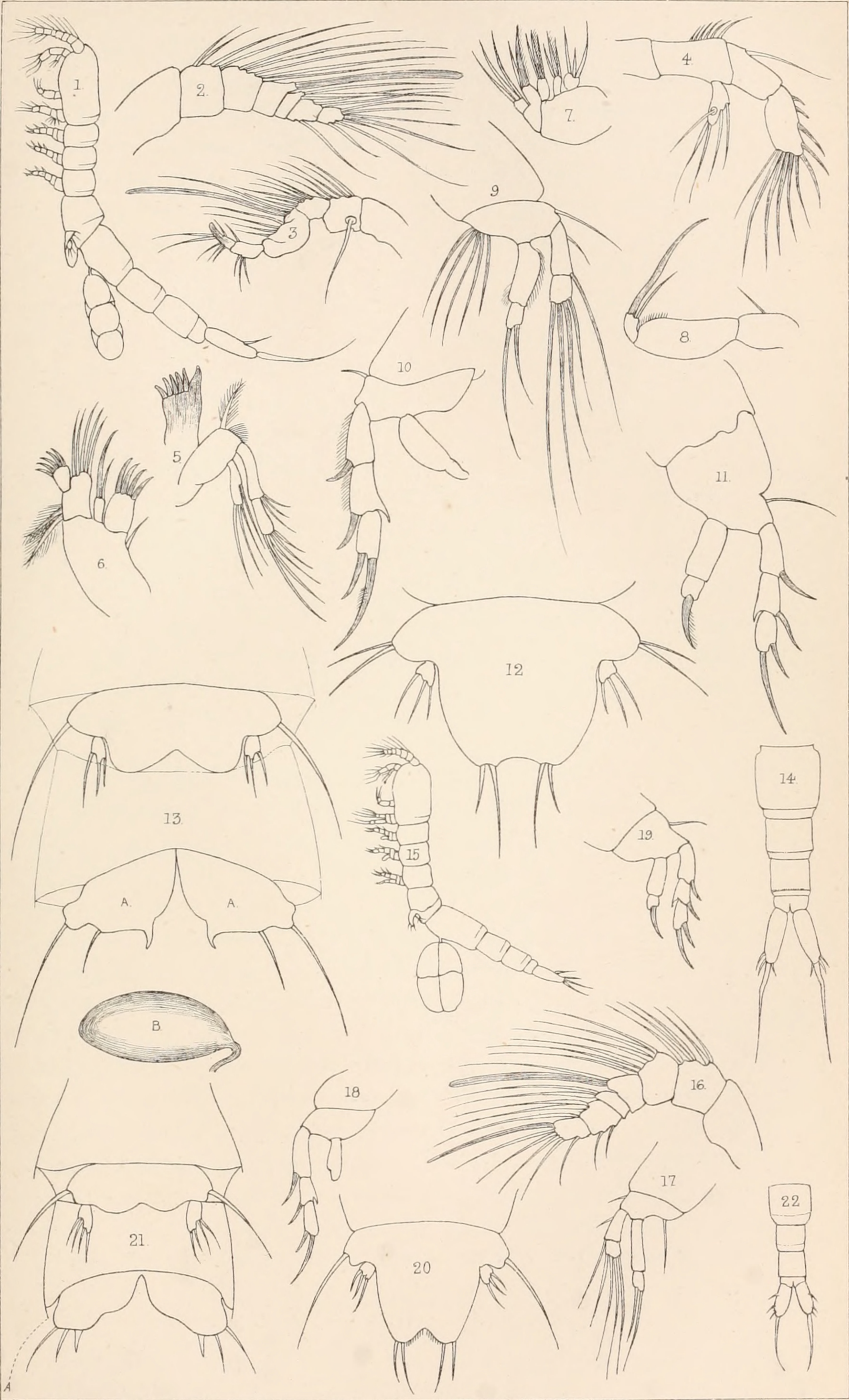
### PLATE II.

IN the following Notes we propose, first, to describe two new species of Copepoda, belonging apparently to the genus *Leptopsyllus*,—a somewhat curious genus recently instituted; and, second, to give additional records indicating an extension of distribution for several species already described.

### DESCRIPTIONS OF TWO NEW SPECIES OF LEPTOPSYLLUS.

*Preliminary Remarks.*—The genus *Leptopsyllus* was instituted for a somewhat abnormal and very slender form of Copepod captured in the Forth, a few miles west of Queensferry,





A. Scott, Del. ad nat.

R. & R. Clark imp.

FIGS. 1-14 LEPTOPSYLLUS ROBERTSONI, Sp. n.  
FIGS. 15-22 LEPTOPSYLLUS MINOR, Sp. n.







on the 25th of January 1894: there were several specimens of this form. On the 20th of August following, three species (two of which are described here), apparently belonging to the same genus, were obtained in the Forth, near Musselburgh—they were taken in pools on the shore, near low-water mark; but these three species, though similar in habit and in general structure to the one obtained west of Queensferry, and for which the genus *Leptopsyllus* was instituted, differ from it in the following points:—1st, the mandible-palp is two-branched instead of one-branched—the distal branch being two-jointed, while the proximal branch, which is smaller, is one-jointed; 2nd, the second and third pairs of swimming feet are two-branched—the inner branches, which are one or two-jointed, being more or less rudimentary. But notwithstanding these and one or two other minor differences, the Musselburgh species are, in our opinion, undoubtedly congeneric with that from west of Queensferry, and we therefore prefer to amend the generic definition as published in part iii. of the “Twelfth Annual Report of the Fishery Board for Scotland,” rather than establish a separate sub-genus for them. The definition of the genus *Leptopsyllus* as amended will therefore be as follows<sup>1</sup>:—

LEPTOPSYLLUS (amended), *T. Scott*, “Twelfth Annual Report of the Fishery Board for Scotland,” part iii. p. 253 (1894).—Body elongate, cylindrical, somewhat similar in form to *Cylindropsyllus*, Brady. Anterior antennæ (in the female, seven or) eight-jointed, short. (In the male the anterior antennæ are modified and hinged for grasping.) Posterior antennæ three-jointed; secondary branch small, one-jointed. Mandibles well developed, the broad biting part armed with several strong teeth; palp comparatively large, consisting of a single two-jointed branch (or of two branches—the distal branch being two-jointed, while the proximal branch, which is smaller, is one-jointed). Other mouth appendages as in *Cletodes*, except that the posterior foot-jaws are three-jointed. Both branches of the first pair of swimming feet short, two-jointed. In the second and third pairs the inner branches (are one or two-jointed and more or less rudimentary, or)

<sup>1</sup> The Amendments are within ( ).



are obsolete or entirely absent, but the outer branches are three-jointed. Inner branches of the fourth pair (usually) two-jointed and the outer branches three-jointed. Fifth pair foliaceous, small, two-branched (basal joints sometimes coalescent and forming a broad lamelliform plate; the fifth pair in the male are smaller than those of the female. One ovisac, containing a few large ova).

LEPTOPSYLLUS ROBERTSONI, *Sp. nov.* (Plate II. Figs. 1-14).

*Description.*—*Female.*—Length .63 mm. ( $\frac{1}{40}$  of an inch). Body elongate and very slender. Anterior antennæ moderately stout, shorter than the first cephalothoracic segment, seven-jointed: the fifth joint is shorter than any of the others, as shown by the formula:—

Proportional length of joints	22	13	10	7	5	8	9
Number of the joints	1	2	3	4	5	6	7

Posterior antennæ nearly as in *Leptopsyllus typicus*, T. Scott. Mouth organs also nearly as in that species, except that the mandible-palp is two-branched; the distal branch, which is slender and elongate, has the end joint equal to about two-thirds the length of the first joint; the proximal one-jointed branch is nearly as long as the first joint of the distal branch. The first pair of swimming feet are similar to those of *Leptopsyllus typicus*, but the inner branches are rather longer than the outer, and there is a fascicle of moderately long setæ on the inner margin of the second basal joint (Fig. 9). In the second and third pairs the outer branches are somewhat similar to those of *Leptopsyllus typicus*; the inner branches, which are rudimentary, are two-jointed, the end-joint being very small (Fig. 10). The fourth pair are similar to those of *Leptopsyllus typicus*. The basal joints of the fifth pair are coalescent, forming a broad lamelliform plate, the end of which is broadly truncate and slightly concave, the obtuse angles being each furnished with two small setæ, and on each side near the base of the joints the outer margin is produced into a broadly rounded lobe terminating in two setæ; the length of the basal joints is equal to about two-



thirds of their entire width across the broadest part; the secondary branches are very small, obscurely triangular in outline, and furnished each with three small setæ on the outer edge (Fig. 12). The caudal stylets are in the form of elongate-ovate lamellæ; in length they are equal to both the last two abdominal segments together, and their breadth is about equal to two-thirds of their length; they are also each furnished with four terminal setæ, the principal seta being about twice the length of the stylets, but the others are very small. Ovisac small, containing a number of moderately large ova.

*Male*.—The male is similar to the female, except in the following particulars:—The anterior antennæ are each six-jointed; the last four joints are modified and hinged, and form powerful grasping organs. The basal joints of the fifth pair of thoracic feet are coalescent, as in the female, but are much shorter, being only about half the length; the sixth pair of appendages are foliaceous, broadly subtriangular in outline, and not coalescent (Fig. 13).

*Habitat*.—In pools near low water on the shore of the Firth of Forth, at Musselburgh; rather rare.

*Remarks*.—This species is at once distinguished from any others of the same genus by the large, lamelliform caudal stylets, and by the form of the fifth pair of thoracic feet, as also by the structure of the anterior antennæ. We have much pleasure in giving to this species the name of our kind friend Mr. David Robertson of Millport, the veteran Scottish Naturalist, who was one of the first to introduce us to that most interesting study—the study of the Microcrustacea.

#### LEPTOPSYLLUS MINOR, *sp. nov.* (Plate II. Figs. 15-22).

*Description*.—*Female*.—Length, .46 mm. ( $\frac{1}{54}$  of an inch). Body elongate, very slender. Anterior antennæ short, moderately stout, seven-jointed, somewhat similar in structure to those of *Leptopsyllus robertsoni*. The proportional lengths of the joints are shown by the formula—

Proportional length of joints	20	14	11	7	5	9	10
Number of the joints	1	2	3	4	5	6	7



Posterior antennæ and mouth organs similar to those of *Leptopsyllus robertsoni*. The first pair of swimming feet are also similar in structure to those of that species, but smaller, and the outer branches are considerably shorter in proportion to the inner branches (Fig. 17). Inner branches of the second and third pairs one-jointed and very rudimentary (Fig. 18). Fourth pair similar in structure to those of *Leptopsyllus robertsoni*, but considerably smaller. The fifth pair are also similar in structure to those of that species, but the coalescent basal joints are proportionally longer, being in length equal to about three-fourths of their entire width at the broadest part. They also differ in form, being subconical in outline and with the apex distinctly bifid. Each of the two apical angles bears two short setæ, and the lateral basal lobes are each furnished with a moderately long hair. The secondary joints are very small (Fig. 20). The length of the caudal stylets is scarcely equal to the combined lengths of the last two abdominal segments, while their breadth is nearly equal to half the length. They are each furnished with a few setæ, the principal terminal seta being about twice the length of the stylets; while one of the others, which are very small, springs from near the middle of the outer margin (Fig. 22). The ovisac contains a few very large ova.

*Male*.—The male is very similar to the female, but the anterior antennæ are modified for grasping, and resemble those of the male of *Leptopsyllus robertsoni*. The fifth pair of thoracic feet, which are very small, also resemble those of that species; but the coalesced basal joints are shorter, and scarcely extend beyond the base of the secondary joints, while the secondary joints are proportionally larger. In the sixth pair of appendages the inner margins are sinuated and slope considerably outwards, the outer margins are short and nearly straight, and the broadly rounded apex is furnished with two small setæ on the outer aspect and a small but stout spine interiorly (Fig. 21).

*Habitat*.—On the shore at Musselburgh, in the same pools with *Leptopsyllus robertsoni*.

*Remarks*.—This species is much smaller than the one last described, and is readily distinguished from it by the form of the caudal stylets, which are comparatively shorter



and broader, and by the difference in the structure of the first and fifth thoracic feet. The ovisac of this species appears to contain fewer but larger ova than that of *Leptopsyllus robertsoni*.

#### RECORDS INDICATING AN EXTENSION OF DISTRIBUTION.

CYCLOPS ÆQUOREUS, *Fischer*, "Abhandl. der Akad. der Wissenschaft," Bd. viii. p. 654, Taf. XX., Figs. 26-29 (1860).—This, which is one of those curious species that form a link between the truly freshwater and the truly marine Copepoda, was obtained in brackish pools near the head of West Loch Tarbert, Argyleshire, on both the north and south sides of the loch. Though widely distributed, the Scottish localities where *Cyclops æquoreus* has been recorded from are, so far as known to us, few in number. It has been "taken by the Rev. A. M. Norman in the West of Scotland";<sup>1</sup> in pools above high-water mark at Cramond Island, Firth of Forth; in the mussel beds at the mouth of the river Eden, Fifeshire; and Loch Stennis, Orkney.

TACHIDIUS LITTORALIS, *Poppe*. [TACHIDIUS CRASSICORNIS, *T. Scott*, "Tenth Annual Report of the Fishery Board for Scotland," part iii. p. 250, Plate VIII. Figs. 14-27 (1892).]

*Tachidius littoralis* was recorded from the Firth of Forth, the first time for Scotland, in 1892. Though as yet known from only a few localities in the British Islands, we believe that it will yet be found distributed all round our shores wherever there is a suitable habitat, *i.e.* brackish water with a muddy and weedy bottom. It was obtained in pools of this description during the month of July last year around the head and north side of West Loch Tarbert.

DELAVALIA PALUSTRIS, *Brady*, "Nat. Hist. Trans. Northumb. and Durham," iii. p. 134, Pl. V. Figs. 10-15 (1868).—This species was taken in pools between tide-marks near the head of West Loch Tarbert. Its distribution in Scotland appears as yet to be very limited. The Firth of Forth is

<sup>1</sup> "A Monograph of the Free and Semiparasitic Copepoda of the British Islands," ii. p. 120; no locality is given.



the only other Scottish locality known to us where *Delavalia palustris* has been obtained.

CANTHOCAMPTUS PALUSTRIS, *Brady*, "Mon. Brit. Copep.," ii. p. 53, Plate XXXIX. Figs. 13-23 (1880).—This well-marked species has, like the last, a very limited known distribution in Scotland; but we believe that, in this case also, it will be found to be more or less frequent when carefully sought for in suitable situations. It has during the last few years been obtained in one or two places in the Firth of Forth, and we have now to record its occurrence in brackish-water pools at the head and on the north side of West Loch Tarbert, Argyleshire.

CLETODES TENUIREMIS, *T. Scott*, "Eleventh Annual Report of the Fishery Board for Scotland," part iii. p. 204, Plate III. Figs. 21-28 (1893).—This interesting and easily distinguished species of *Cletodes* has not been observed beyond the Forth area till last summer, when it was obtained at West Loch Tarbert in brackish-water pools along with *Canthocamptus palustris*.

PLATYCHELIPUS LITTORALIS, *Brady*, "Mon. Brit. Copep.," ii. p. 103, Plate LXXIX. Figs. 15-19 (1880); *T. Scott*, *op. cit.*, p. 205, Plate V. Figs. 11-13 (1893).—The known distribution in Scotland of this curious species is, like that of most of the others recorded here, hitherto very limited, and so far as we know the present record of its occurrence in West Loch Tarbert is the only record for the West Coast. It was obtained in hand-net gatherings from brackish-water pools along with *Canthocamptus palustris* and *Cletodes tenuiremis*.

All the species recorded in the preceding notes have hitherto been obtained only where there was an admixture in greater or less proportions of sea and fresh water. These brackish-water forms frequently exhibit a curious combination of characters interesting to the biologist, but often very troublesome to the systematist. We believe that there is still a rich harvest to be reaped by the study of these peculiar intermediate conditions of habitat and life. It may well be said—

"The earth is full of Thy riches;  
So is this great and wide sea."



## EXPLANATION OF PLATE II.

LEPTOPSYLLUS ROBERTSONI, *sp. nov.*

Fig. 1. Female, lateral view $\times 80$ dia.	Fig. 9. Foot of first pair of
„ 2. Anterior antenna,	swimming feet $\times 380$ dia.
female . . . $\times 330$ „	„ 10. Foot of second pair $\times 380$ „
„ 3. Anterior antenna,	„ 11. Foot of fourth pair $\times 380$ „
male . . . $\times 500$ „	„ 12. Fifth pair of feet,
„ 4. Posterior antenna $\times 380$ „	female . . . $\times 380$ „
„ 5. Mandible . . . $\times 380$ „	„ 13. Fifth pair and sixth
„ 6. Maxilla . . . $\times 380$ „	pair, male . . . $\times 380$ „
„ 7. Anterior foot-jaw $\times 380$ „	„ 14. Abdomen and
„ 8. Posterior foot-jaw $\times 380$ „	caudal stylets $\times 80$ „

LEPTOPSYLLUS MINOR, *sp. nov.*

Fig. 15. Female, lateral	Fig. 19. Foot of fourth pair $\times 380$ dia.
view . . . $\times 80$ dia.	„ 20. Fifth pair of feet,
„ 16. Anterior antenna $\times 500$ „	female . . . $\times 380$ „
„ 17. Foot of first pair of	„ 21. Fifth pair and sixth
swimming feet $\times 380$ „	pair, male . . . $\times 380$ „
„ 18. Foot of second	„ 22. Abdomen and
pair . . . $\times 380$ „	caudal stylets $\times 80$ „

## NOTES ON THE FLORA OF ELPHIN AND THE ROCKS OF CNOC-AN-T'-SASUNNAICH IN WEST SUTHERLANDSHIRE.

By G. CLARIDGE DRUCE, M.A., F.L.S.

LAST June I paid a visit of a few hours to Ledbeg in West Sutherland, in order to verify records made by Dr. Lightfoot in the "Flora Scotica" (which was published in 1777) of *Dryas octopetala*, *Draba incana*, *Asplenium viride*, and *Polypodium* (*Polystichum*) *Lonchitis*, the former of which he says "he found abundantly for two miles together upon a vast limestone rock called Creg-achnocæn, upon the boundaries of Coygach and Assynt, just on the confines of Ross-shire and Sutherland, about ten miles from Loch Broom, in the road to Ledbeg, upon the western coast." The *Draba* and the two ferns were gathered by him in the same locality. On the faith of these records the four plants were included in "Topographical Botany" for West Ross; but, as the actual occurrence of the plants in both counties was a little uncertain, since the limestone rocks are represented on the geological