

SECONDARY  $\gamma$  RADIATION.

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## INTRODUCTION.

As a result of the passage of  $\gamma$  rays through matter, secondary rays of two types make their appearance. As it will be necessary to distinguish between the secondary rays which proceed from the sides at which the original  $\gamma$  rays enter and emerge from the plate which they penetrate, we shall refer to these as the "incidence" and "emergence" rays respectively.

The secondary radiation consists of  $\beta$  and of  $\gamma$  rays.

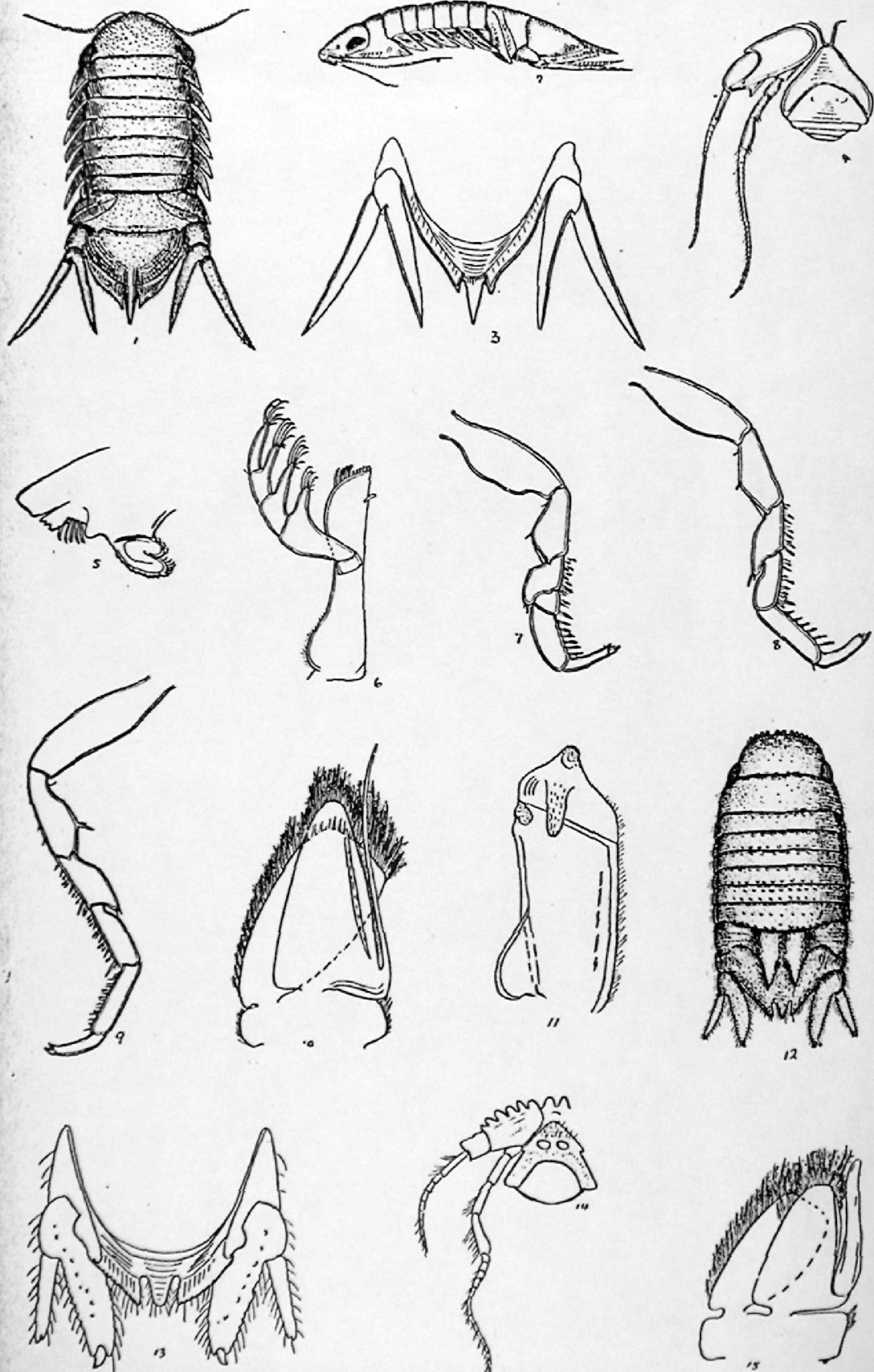
The former appear on both sides of the plate; the "incidence"  $\beta$  rays have been recently investigated in some detail by Kleeman (Phil. Mag., Nov., 1907) and by Eve (Phil. Mag., June, 1908).

In papers by Professor Bragg and myself (Phil. Mag., May, 1908; Trans. Roy. Soc., S. Aus., v. xxxii., 1908) it is shown that most of the experimental results so far obtained with these rays can be very simply explained on the "material" theory, if we suppose that the  $\beta$  radiation is produced directly from the  $\gamma$  particle and at the outset moves in the direction of the original  $\gamma$  radiation, subsequently undergoing scattering in the ordinary manner of  $\beta$  rays.

The second type of secondary radiation resulting from the primary  $\gamma$  rays, viz., the secondary  $\gamma$  rays, have been investigated on the incidence side of plates of different material by Kleeman (Phil. Mag., May, 1908), and later by Eve (Phil. Mag., Aug., 1908).

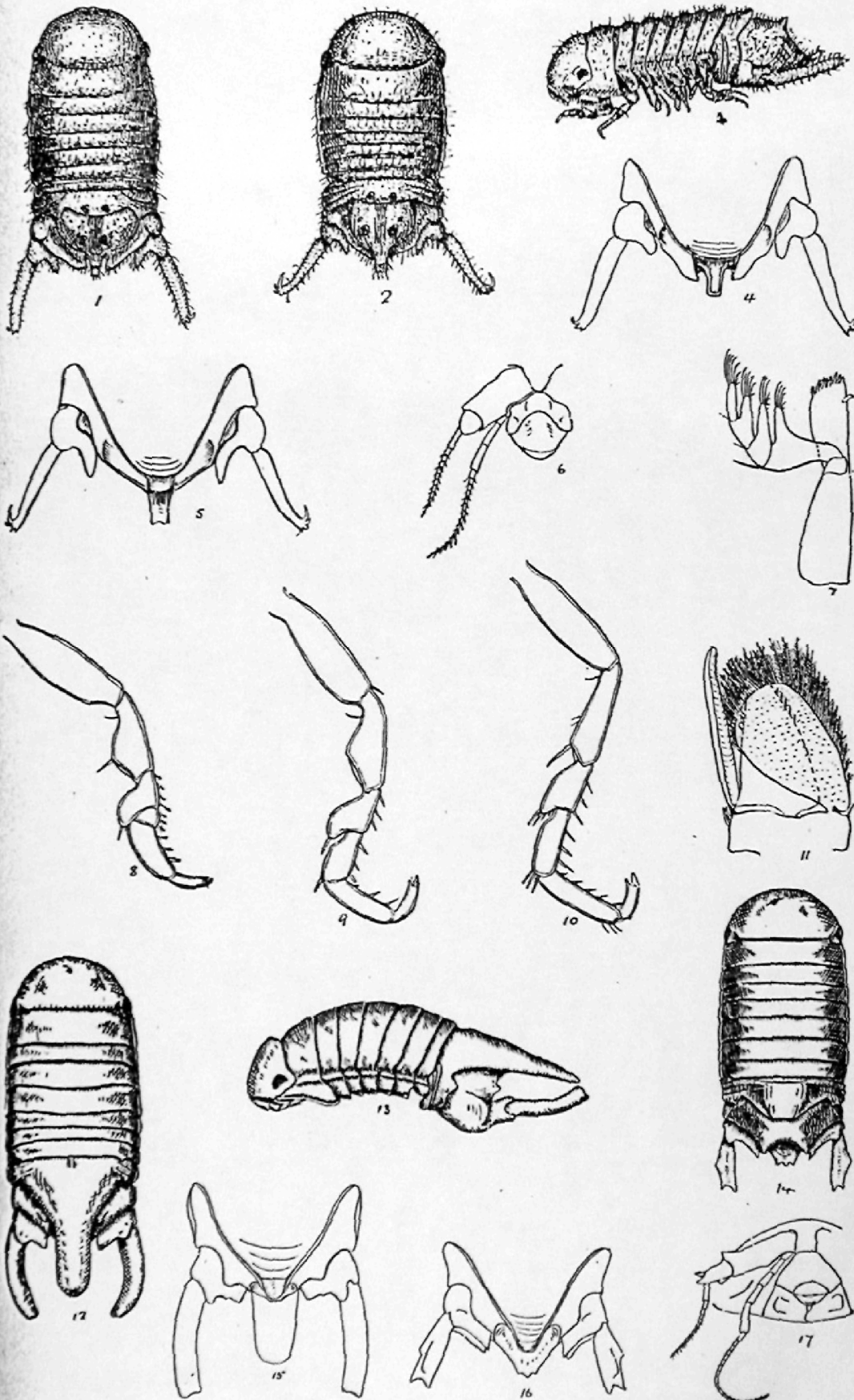
It was a deduction made by Professor Bragg (Trans. Roy. Soc., S. Aus., Jan., 1908) from the theory of the material nature of X- and of  $\gamma$  rays previously propounded by him, that "the existence of modified or softened  $\gamma$  rays might be suspected, since there is an analogous effect in the case of X-rays; and probably they would be found more at the back of the penetrated plate than in front of it." The back and front sides spoken of here refer of course to the sides of emergence and incidence respectively.

It will be shown in the present paper that this prediction is fulfilled very exactly; that the want of symmetry in the amount of radiation from the two sides of the plate is very marked, that a softening of the original rays is effected,



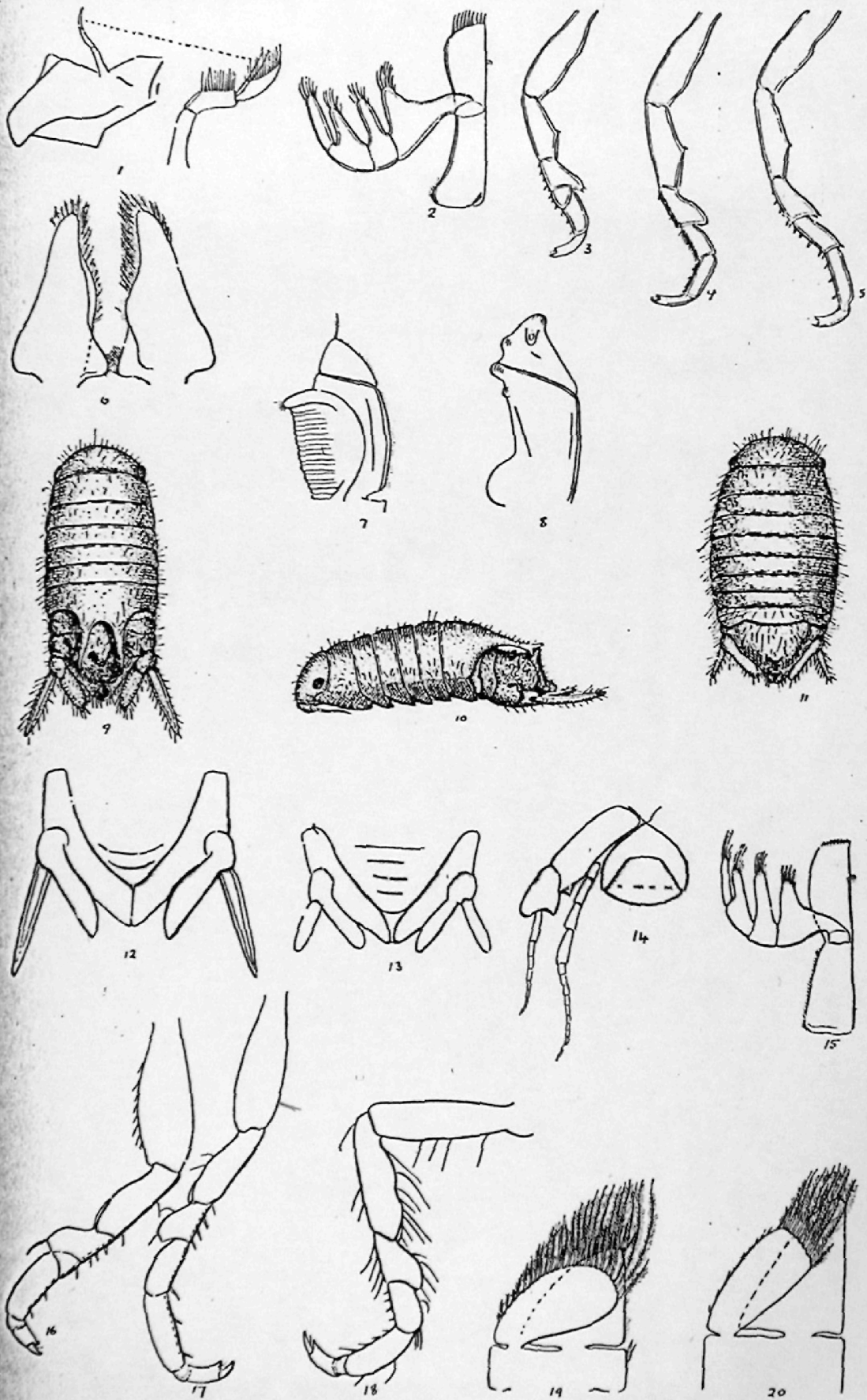
CYODOCE LONGICAUDATA, *n. sp.*

CYODOCE TUBERCULOSA, *Stebbing.*



CYMODOCE HAMATA, *n. sp.*

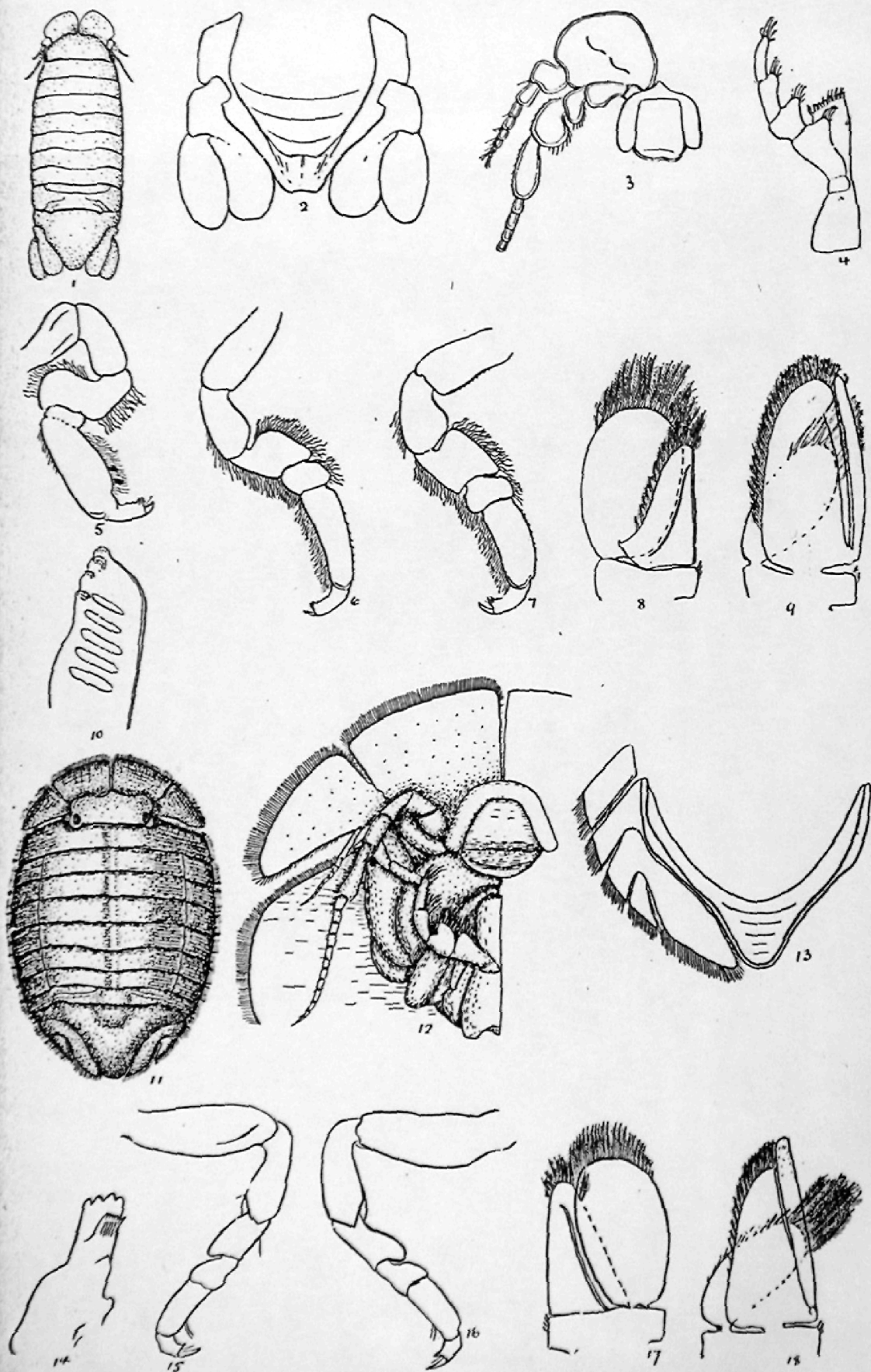
CILICÆA CURTISPINA, *Haswell.*



CILIOCÆA CURTISPINA (continued)

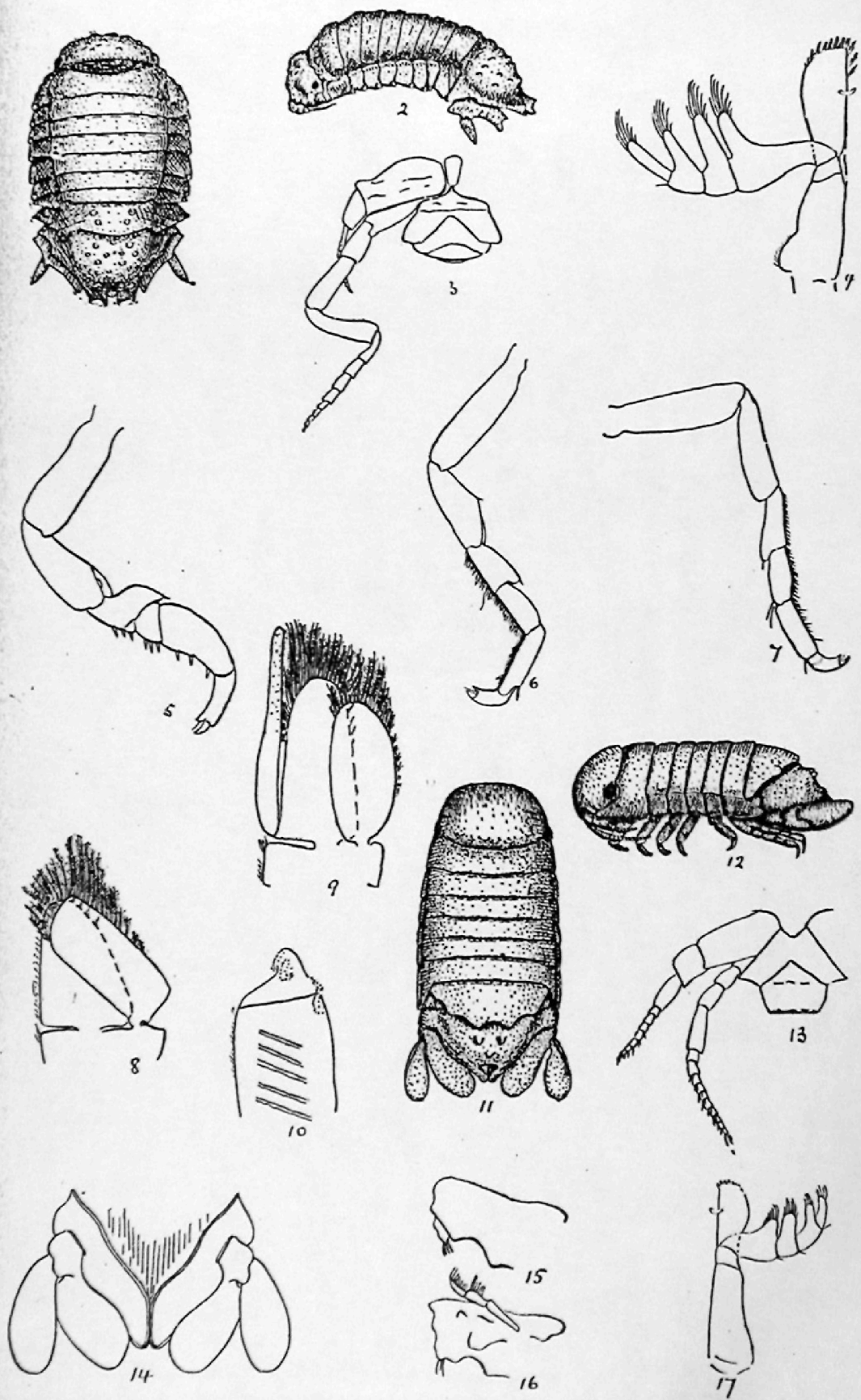
DYNAMENE RAMUSCULA, n. sp.





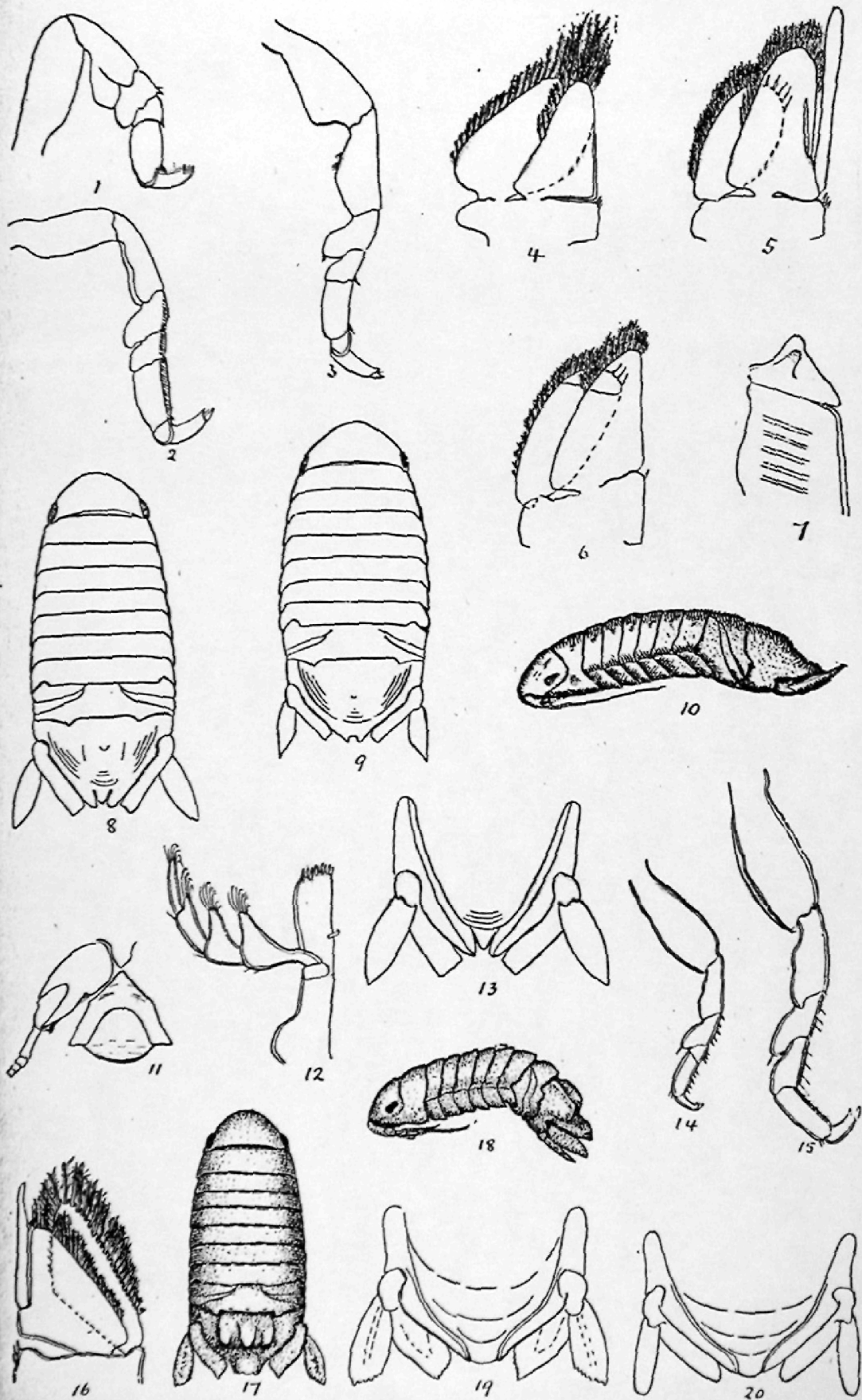
AMPHOROIDEA ANGUSTATA. n. sp.

AMPHOROIDEA ELLIPTICA, n. sub. gen., n. sp



MORULOIDEA LACERTOSA, n. gen., n. sp.

DYNAMENOPSIS OBTUSA, n. gen., n. sp.

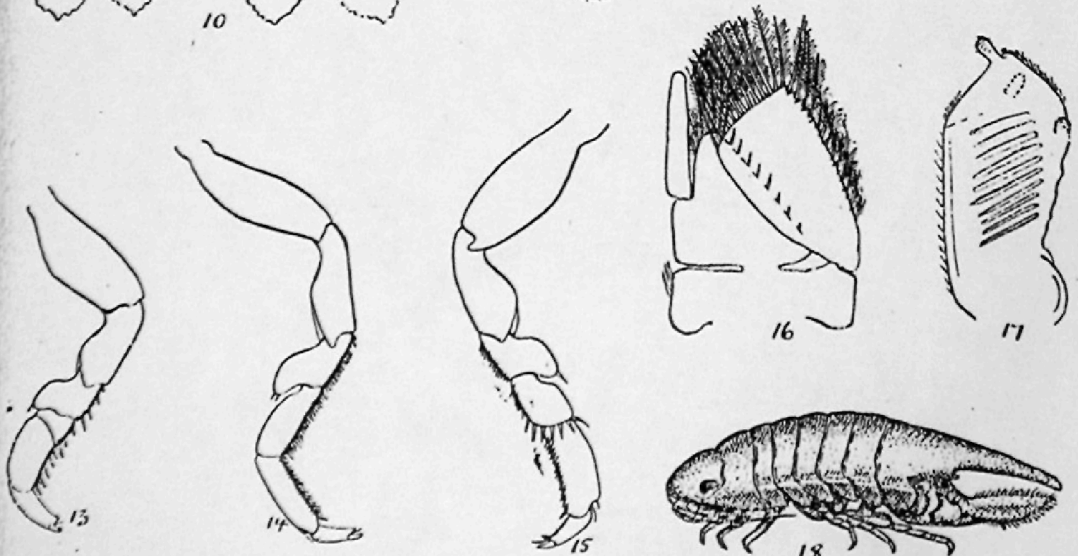
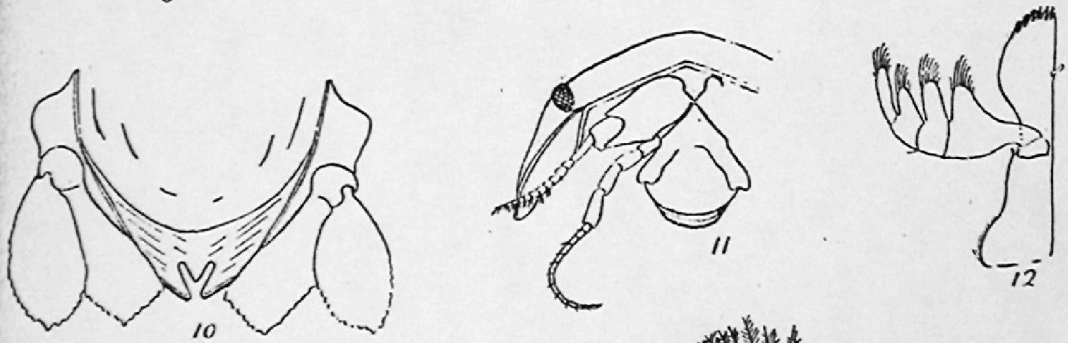
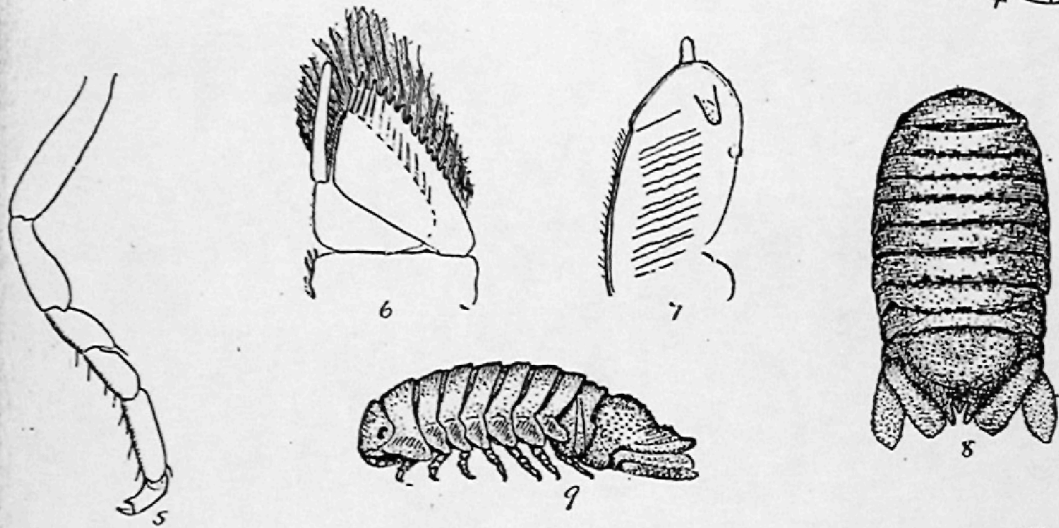
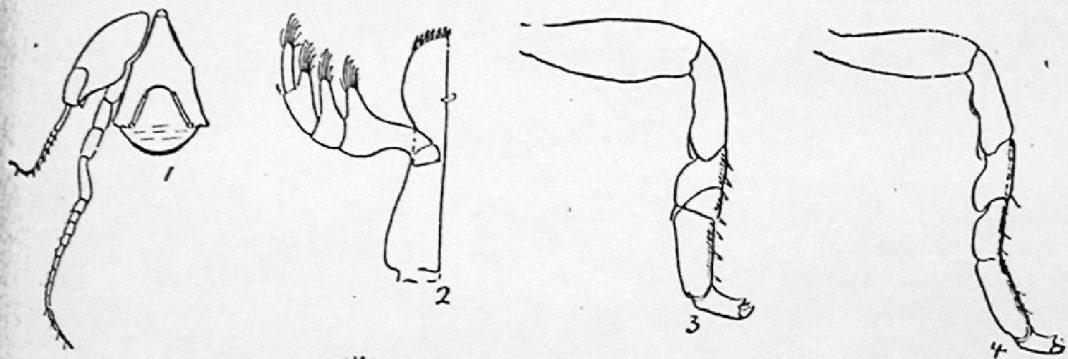


DYNAMENOPSIS OBTUSA (continued).

CIRCEIS TRIDENTATA.

CIRCEIS TRILOBATA, n. sp.



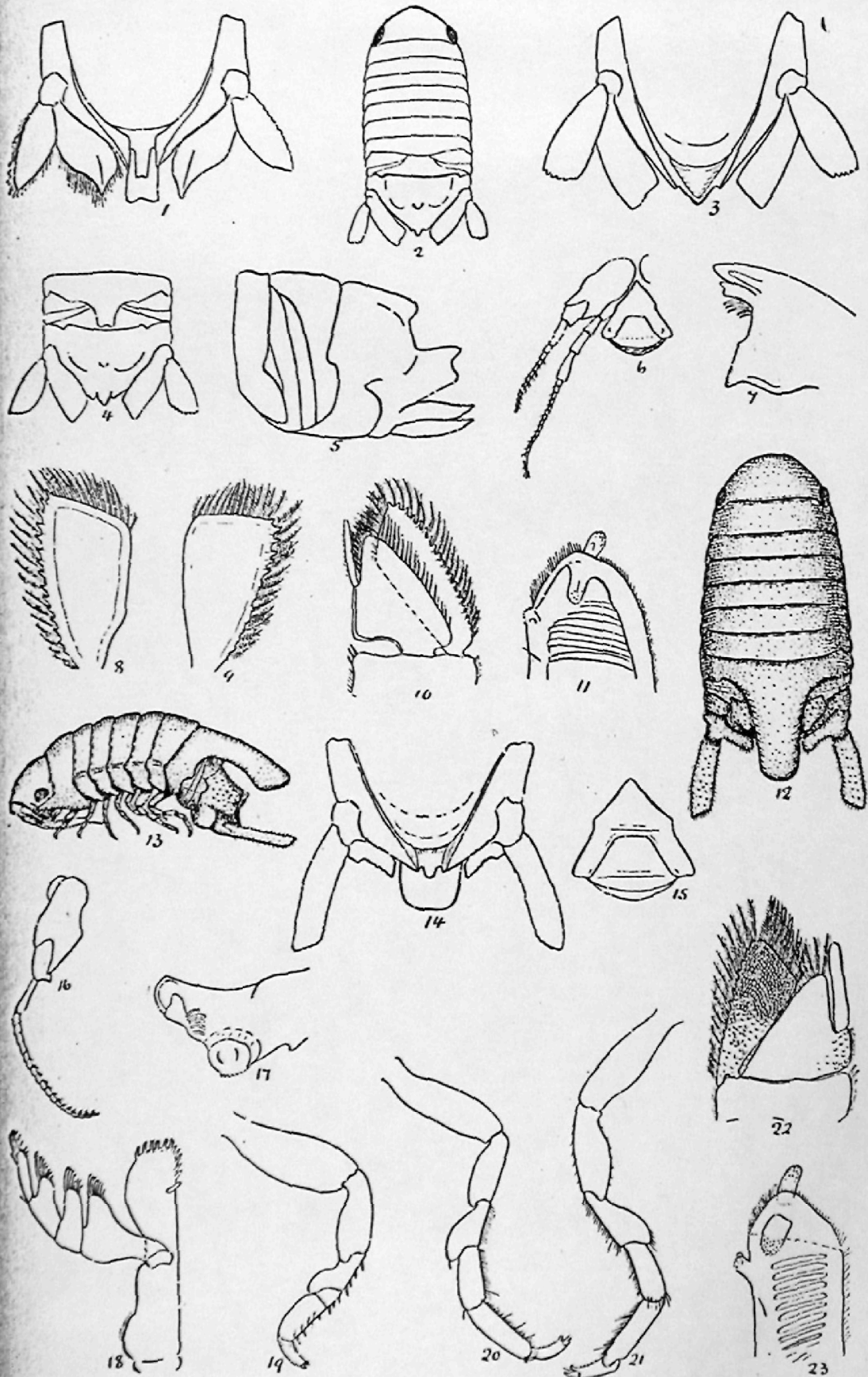


CIRCEIS TRILOBATA (continued)

CIRCEIS OBTUSA, n. sp.

HASWELLIA EMARGINATA, Haswell.





HASWELLIA EMARGINATA (continued.)

HASWELLIA CILICIOIDES, n. sp.