

are long and slender, the brush of cilia is much more extensive and is carried nearer the distal extremity than in *Palinurus*. In this genus the lateral spines (Fig. VII., *b''*) are smooth on each side and curl over to meet one another and protect the membranous cilia that lie between. In this genus these organs (Fig. VII., *b'''*) have parallel sides and terminate in a rounded extremity, the apex of which, as M. Robin says, carries a hyaline body.

Mr. G. L. Gulland<sup>1</sup> traces out what he considers the genealogy of these hairs in the Crustacea, starting with a primitive seta, allied to a fringing seta, but not so flattened.

This ideal setæ stood over a wide canal; the lumen was closed, there was a single row of bristles on each side, and a nerve-ending attached to its base. Now these fringing setæ originated in one direction, and the sensory setæ originate in another; these were at first primary tactile setæ, which became modified in three directions, to give rise to auditory, olfactory, and tactile setæ. He does not in his paper discuss in detail the structure of the olfactory and auditory setæ, but restricts his observations to the consideration of the tactile and fringing setæ.

He furthermore remarks<sup>2</sup> that in addition to the sensory hairs "there is a ring of tactile setæ set rather far apart round the distal margin of each segment, the points of which are directed forwards; they are of the usual type, but very small, often not exceeding 0.1 mm. in length on the two or three most distal segments where the olfactory setæ are absent, the tactile setæ are longer and more



FIG. VII.—*Panulirus*. Antenna—*b*, outer flagellum; *b''*, section of same; *b'''*, sensory cilium.

numerous on the last segment." "On the third joint of the main stem there is one large group of tactile setæ on the outer margin at the base of the exopodite (outer flagellum),<sup>3</sup> and one or two isolated setæ near it; on the inner margin is a row of fringed setæ, and all the setæ on the first and second joints are also of this kind, with the exception of a very few small tactile ones in the inferior margin of the triangular first joint. If the antennule be examined *in situ* the significance of this arrangement will be at once apparent; for it will be seen that only those parts which bear tactile setæ

<sup>1</sup> *Proc. Roy. Phys. Soc. Edin.*, vol. ix. p. 159, 1885-86.

<sup>2</sup> *Loc. cit.*, p. 160.

<sup>3</sup> This cannot be homologous with the exopodite since it springs from the third joint, whereas the exopodite (basephysis) springs from the second or basal joint.