

those involving two modified structures (e.g., 2, 10, 12, 19 and 26) and it is difficult to believe that they do not produce sounds in living animals.

This is supported by study of *O. georgei*, which has the dactyl and merus of the first walking leg of the male modified in a manner comparable to the species of the *O. punctatus* subgroup, but has no correspondingly modified rasps. Either the dactyls in the two subgroups are not modified for stridulation, or *O. georgei* can in this instance produce functional sounds from unmodified rasps. The latter is the much more likely alternative, particularly since at least one conspicuously loud sound can be produced (engagement 9).

In the *O. iridescens* subgroup the second and third walking legs are modified, being multiradiate and, in males, strongly cornified. Again there are no obviously modified rasps, and again the production of loud noises in certain cases (engagements 3 and 3) strongly suggests that the modifications are functional for sound production. While in this species there are some engagements additional to the common generic pattern, their relationships to it are obvious.

In both the *O. iridescens* and *O. ocellatus* subgroups there is a conspicuously modified rasp comprising the striae of the pterygostomial region, but in each subgroup a different plectrum is moved horizontally across it. The simplest way to account for the evolutionary development of these structures would be to assume that a horizontal movement of the chelipeds across the anterior ventral surface of the carapace produced minor noises, which have been augmented and replaced by those involving the special modifications. On this basis the cuticular arc would be the probable stationary structure, and would correspond with the "*pars stridens sous-orbitaire*" of Guinot-Dumortier and Dumortier (1960) although in a barely modified form. In different species of the two subgroups this is engaged by various structures and gives three different engagements, viz., 57, 65, and 16. The suggestion of replacement of one engagement by another is supported by comparison of the two very closely related species in the *O. ocellatus* subgroup. In *O. ocellatus* engagement 16 produces a loud noise, but in *O. guadulpensis* the pterygostomial striae are too salient to permit the engagement to be effected.

The most obvious modifications in *O. georgei* are the granular ridges on the dorsal surface of the carapace which are engaged by the cornified carpus of the swimming legs. There is nothing equivalent in other species of the genus, and the nearest counterpart in the crabs appears to be in the genera *Potamon* and *Dotilla* (see Guinot-Dumortier and Dumortier, 1960).

Possible functions of animal sounds which have been suggested include sexual behaviour (attraction, and identification of mates, courtship and competition), "family" behaviour (between young and parents and individual recognition), community behaviour (group activity, territory marking, alarm calls, and food notification and guidance) and sound ranging (Busnel, 1963). Guinot-Dumortier and Dumortier (1960), use a different basis for primary grouping and distinguish between sounds mostly concerned with the same species and those mostly concerned with other species. The former would include sexual attraction, advertisement to the opposite sex, menace towards the same sex, territory advertisement, collective grouping signals, and information signals such as warnings of predators. The latter, which are all evidently intended to intimidate other species, may also act as warning signals to individuals of the same species.

In most cases where stridulatory structures have been described in crustaceans, sounds have not been heard, but are presumed to be produced (Guinot-Dumortier and Dumortier, 1960; Dumortier, 1963a). In still fewer cases have the significance of the sounds been suggested or established. Of these, intimidation or warning sounds are known from several groups involving such crab genera as *Acanthocarpus* (Rathbun, 1937); *Calappa* (Fish, 1964); *Matuta* (Alcock, 1896, 1902; also unpublished