DESCRIPTIVE AND BIOLOGICAL NOTES ON THE RARE ANTARCTIC ISOPOD *Serolis ovata* Sheppard (CRUSTACEA : FLABELLIFERA)

By M. G. WHITE

ABSTRACT. Sheppard's description of *Serolis ovata* is augmented with details of the mature male and female. The colour of live specimens is recorded and an increase in sculpturing of the exoskeleton with increase in size noted. The species has been found on gravel substrates from the littoral to 21 m. at Signy Island, South Orkney Islands, usually associated with *S. polita*. Stomach contents suggest that it is an active predator. Evidence of a reproductive cycle is capable of ambiguous interpretation.

ALL the known species of the Serolidae were reviewed and a number of new species were described by Sheppard (1933) in her monograph and in a supplement (Sheppard, 1957). Since that time a small number of new species has been described, notably *Serolis bonaerensis* Basida and Torti (1967), and *S. pasternaki* and *S. spinosa* by Kusakin (1967). Hale (1952) described *S. johnstoni* during the interval between Sheppard's papers. The new species *S. ovata* was erected by Sheppard in 1957 on the basis of a single immature specimen collected near Clarence Island, South Shetland Islands, from a depth of 210–180 m. by *Discovery* during 1936.

A number of individuals of this species has subsequently been recorded among samples of the epibenthos from Borge Bay (lat. 60°43′S., long. 45°36′W.), Signy Island, South Orkney Islands. As these are of both sexes and at different stages of development, a description of this material would be a useful supplement to Sheppard's account and help to elucidate the features characteristic of live specimens of the mature male and female.

MATERIAL AND METHODS

Collections of benthic organisms were made from Borge Bay during the period February 1966 to February 1968 using a number of different methods as part of an investigation of the distribution and biology of isopod species from the epibenthic environment. A 1 m. Agassiz dredge was the principal device used but specimens were also collected using a beam trawl and by hand along the shore and from the sub-littoral (Lewis, 1964) by diving. 17 specimens were collected during this period and a further ten were found among preserved material collected by previous biologists working for the British Antarctic Survey.*

Specimens were "rough" sorted in the laboratory and preserved in 10 per cent neutralized formol saline (by volume) or 70 per cent methanol for more detailed observations at the Zoology Section in the United Kingdom. Relevant particulars of the specimens are presented in Table I.

MORPHOLOGY

As is characteristic of other species of *Serolis*, the females were more oval in shape than the males. The ratio of length to breadth for this group of specimens was $1 \cdot 223 \pm 0 \cdot 0094$ for males and $1 \cdot 263 \pm 0 \cdot 0105$ for females. Adult males were slightly larger than adult females (Table I). Sheppard commented on the sculpturing of the exoskeleton and this increases throughout development to obscure the pigment patterns in adult specimens. In both sexes the setation also increases with age and, in common with other members of the family, the secondary sexual characteristics are gradually acquired. The oostegites and appendix masculina can be observed early in development so that sex can be ascertained at a young stage. The number of segments of the flagellum of the first and second antennae increases in number with increase in size, and the aesthetascs likewise, but adult males possess more of these sense organs than adult females (Table I).

The mandibles (Fig. 1a), not figured by Sheppard, are stout and the incisor process is well developed. The palp has three segments, the third being half as long as the second. The proximal segment has 20 simple spines at the distal outer edge and the second segment has 21 spines along the ventral border.

* F. O'Gorman, two specimens, 1959; P. Redfearn, three specimens, 1964; I. Everson, five specimens, 1965.

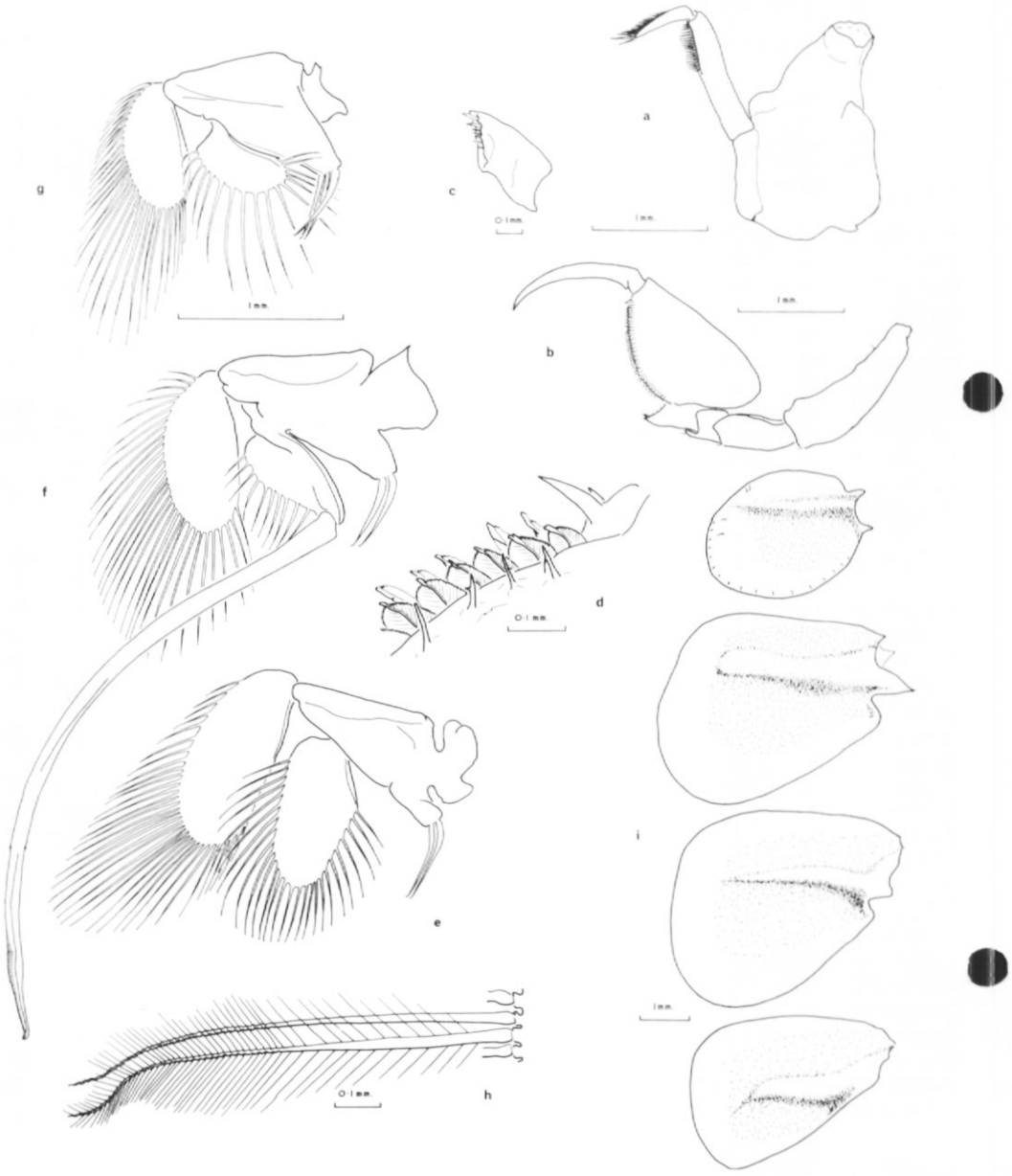

Fig. 1. Appendages of *Serolis ovata* Sheppard.
a. Mandible. b. First peraeopod. c. Enlargement of first peraeopod carpus. d. Detail of modified spines on first peraeopod propodus. e. First male pleopod. f. Second male pleopod. g. Third male pleopod. h. Enlargement of plumose spines from the pleopoda. i. Oostegites of adult female.

TABLE I. DETAILS OF INDIVIDUALS OF *Serolis ovata* Sheppard EXAMINED

Number	*Date*	*Site*	*Method*	*Depth* (m.)	*Sex*	*Condition*	*Eggs*	*Condition*	*Length* (mm.)	*Aesthetascs*	*Incrustation*
O'Gorman 1360	18 Oct. 1959*	Paal Harbour	Dredge	20	♂	Mature			16·9	21	+
					♂	Immature			7·9	10	–
Redfearn 2214	27 May 1964*	Borge Bay	Trawl	17	♀	Immature			12·5	11	–
Redfearn 2087	14 Sep. 1964*	Borge Bay	Trawl	20	♂	Premature			13·7	17	–
Redfearn 2114	20 Sep. 1964*	Borge Bay	Trawl	21	♀	Immature			8·2	8	–
Everson 3391	10 Aug. 1965*	Borge Bay	Fish stomach	14	♀	Mature	35	Release phase young	16·2	(–)	+
					♀	Immature			8·5	10	–
Everson 3392	21 Aug. 1965*	Borge Bay	Dredge	18	♂	Immature			12·3	14	+
Everson 3393	25 Aug. 1965*	Borge Bay	Dredge	10	♂	Mature			17·1	21	–
					♀	Mature	66	Newly laid	16·4	(7)	–
White 1350	23 Dec. 1965	Borge Bay	Dredge	15	—	Juvenile			5·0	3	–
White 1351	25 Jan. 1966	Borge Bay	Dredge	18	♂	Mature			16·4	21	–
White 1352	25 Jan. 1966	Borge Bay	Dredge	12	♀	Mature	36	Embryos	15·0	15	+
White 1353					3♀	Immature			12·6	12	–
White 1354									12·5	12	–
White 1355									12·2	12	–
White 1356	26 Jan. 1966	Borge Bay	Dredge	10	♀	Mature	0		14·4	15	+
White 1357	27 Mar. 1966	Borge Bay	Dredge	16	♂	Premature			13·7	17	–
White 1358	30 Sep. 1966	Borge Bay	Fish stomach	6	♀	Immature			12·7	12	–
White 1359	28 Dec. 1966	Borge Bay	Trawl	15	♂	Mature			17·3	21	–
White 1360					♀	Premature			13·9	10	–
White 1361	13 Jan. 1967	Borge Bay	Dredge	6	♂	Immature			10·1	12	–
White 1362	27 Jan. 1967	Borge Bay	Dive	16	♂	Mature			18·3	(9)	+
White 1363	9 Feb. 1967	Borge Bay	Dredge	10	♂	Mature			17·3	(20)	+
White 1364	11 Mar. 1967	Borge Bay	Hand	2 Shore	♀	Mature	0	Spent	15·6	(–)	–
White 1365	24 Oct. 1967	Borge Bay	Dive	4	—	Juvenile			5·3	5	–
White 1366					—	Juvenile			5·0	5	–

* Specimens collected by previous biologists.
( ) First antenna damaged and so aesthetasc number low.

\+ Presence
– Absence
} epizoic organisms.

The first peraeopod has the dactylus, propodus and the carpus modified to form a grasping gnathopod (Fig. 1b). The carpus (Fig. 1c) bears bifid spines on the posterior distal edge, set back on the dorsal side. Two principal spines are at the posterior distal corner. The propodus is expanded laterally and bears three parallel rows of spines on the posterior border (Fig. 1d). The simple cylindrical spines of the most ventral row often have a single barb a little over halfway along their length. Adult males characteristically bear 19–21 of these spines and adult females 9–10. The 33 spines of the median row have a central rib and are expanded laterally to overlap each other. The edges of these broadly oval spines are finely serrated. The 31–34 spines of the most dorsal row are distally bifid and expanded on the dorsal side. The row is terminated at the distal end by a pair of large simple spines raised on a slight prominence. The dactyl is simple and recurved, and approximates to three-quarters of the length of the propodus. It may overlap the carpus in mature specimens.

Fig. 2 indicates the morphological changes of the second peraeopod which occur during development from juvenile to the pre-adult and adult male and female. The most radically

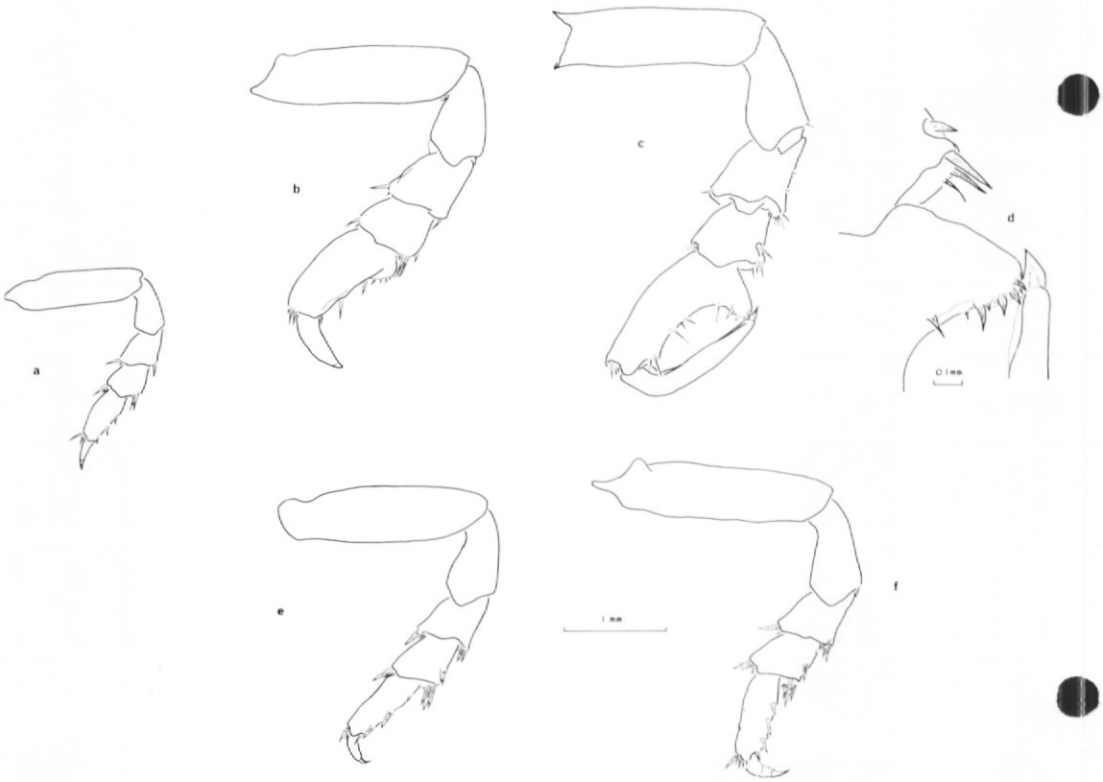

Fig. 2. Morphological changes of the second peraeopod of *Serolis ovata* Sheppard.
a. Juvenile. b. Pre-adult male. c. Adult male. d. Enlargement of the propodus "thumb" and dactylus of the adult male. e. Pre-adult female. f. Adult female.

modified is that of the mature male which is adapted for effectively grasping the front edge of the female cephalosome, but there is no penetration of a membraneous hymeneal area of the female cephalosome as is normal for *Serolis cornuta* (Studer) during pre-copulative pairing. This thin area of the exoskeleton would appear to be homologous with the "frontal sense organ" of *S. paradoxa* Fabricius (Grube, 1875), which is commonly found among the Serolidae (Beddard, 1884), but that Sheppard (1933) considered to be an area abraded by the distal end of the propodus of the second thoracic appendage. However, it is possibly not fortuitous that all the females of *S. paradoxa* in my collection from the Falkland Islands (White 1367–1376)

were gripped by the males at this structure on the cephalosome. The propodus of the mature male is enlarged and expanded at the proximal posterior corner into a thumb-like projection bearing six strong spines. Three further spines are located midway along the posterior edge, there are two spines at the distal posterior corner, and three robust spines at the anterior distal border. Some variation occurs in the number of spines found on the propodus as they are frequently absent or shortened by damage. The dactylus increases from about two-thirds of the length of the propodus to equality during the moult of the premature male to adult male and may be armed with a strong terminal spine.

The protopodite of each of the first three pleopods of the adult male is triangular (Fig. 1e–g) and at the proximal posterior corner the first and second bear a pair of robust hooked plumose spines. The third pleopod (Fig. 1g) has three spines at the same position. The exopod and endopod have more delicate spines which are plumose to the base (Fig. 1h). The distal half of these spines is normally constricted to appear beaded but the terminal portions may be sinuous where the secondary spines are alternate. The appendix masculina of the mature male on the second pleopod is three to four times the length of the protopodite and is grooved for about one-third of its length at the distal extremity.

The marsupium of the adult female is composed of four pairs of oostegites at the base of the first to fourth peraeopods. The most anterior pair overlap the base of the maxillipeds and the pair of oostegites to the posterior, and similarly each successive pair overlaps those behind. The first pair of oostegites is the smaller and has an oval outline, the others are more triangular, the anterior and posterior sides are near-straight and the median side smoothly curved (Fig. 1i). Each lamella has three distinctive zones. A central supporting rod surrounded by a chitinized area and the whole, except at the junction with the coxipodite, is fringed by a broad membraneous edge. The posterior three pairs of oostegites are devoid of spines but the anterior pair has a row of small spines near the posterior, median and the median-anterior edge.

The telson is somewhat variable at the terminal extremity, which is normally rounded but may be upturned and truncate.

Colour

When alive, *S. ovata* is readily distinguished in collections from the more numerous *S. polita* because of its striking coloration. The dorsal surface of the organism has an overall sandy pink hue with two longitudinal rows of violet rings on the second to sixth thoracic somites. These coloured rings are indicated in Sheppard's figure as being pigmented and they characteristically remain as dark grey areas on preserved specimens. Frequently the rose colour remains when specimens are preserved and stored in formol saline.

The pigmentation of the exoskeleton may be obscured by the heavy sculpturing of the surface in adults and by encrusting organisms. Adults are commonly encrusted with bryozoans, foraminiferans, hydroids and two species of spirorbinid. A diatom felt characteristic of *Glyptonotus antarcticus* from shallow waters during the summer months was not observed.

Habitat

Specimens were found beneath stones in the littoral zone to a depth of 21 m. Dredge-sample observations suggest that *S. ovata* was associated with *Serolis polita* Pfeffer which is commonly distributed at Signy Island on gravels, sands and silts over a similar bathymetric range. *Serolis cornuta* is the common member of the genus from similar substrates at depths greater than 20 m. Visual observations whilst diving suggested that *S. ovata* is most commonly found on gravels or among small pebble substrates.

Stomach Contents

Three specimens were dissected and were found to contain fragments representative of four distinct crustacean orders (Table II). Additional prey organisms would undoubtedly have been demonstrated but, as there are few specimens of this species, it would be irresponsible to destroy more of them. However, it would appear reasonable to infer that *S. ovata* is an active predator upon small benthic Crustacea.

TABLE II. STOMACH CONTENTS

Specimen	*Group*	*Number*	*Species total*
14/9/64♂	Platypoda	2	1
	Copepoda	1	1
	Amphipoda	5	4
27/5/64♀	Amphipoda	3	2
27/1/67♂	Isopoda	1	1
	Amphipoda	2	2

REPRODUCTIVE CYCLE

Three ovigerous females and two females which had released their young were found among the collection and this evidence is liable to contradictory interpretation.

Two of the ovigerous females were collected during August, one with newly laid eggs and the other actively releasing young instars from the brood pouch. The third female had intermediate stage embryos (C_2 stage; Holdich, 1968) in the marsupium during January. This suggests that breeding is seasonal and development prolonged with a marsupial stage approximating to a year. *Bovallia gigantea* (Pfeffer), the common shallow-water amphipod has a similar cycle but shorter development. It lays eggs in late February or March and releases young stages about 7 months later (Thurston, 1968). However, a spent female was observed in January and another in March which may indicate that breeding can continue throughout the year as in *Glyptonotus antarcticus* Eights (Dearborn, 1967; White, 1970), or as suggested for *Serolis schythei* Lütken and *S. exigua* Nordenstam (Sheppard, 1933).

Additional specimens should resolve this ambiguity.

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