

powerful force which broke up and transported the bodies before they had completely decomposed, was probably the same in each case; while the final resting-place of the bones both at Pikermi and Drazi must have been beneath comparatively tranquil water, where they could be quickly buried in mud. The absence of all trace of vegetable matter is curious; but the most plausible explanation of the broken limbs and torn portions of trunks seems to be, that the bodies were hurried by torrential floods through thickets or tree-obstructed watercourses, before they reached the lakes in which they finally rested. Accompanying stones in rapid motion may account for some of the bone-fragments.

II.—ON SOME CRUSTACEA COLLECTED BY MISS CAROLINE BIRLEY AND MISS L. COPLAND FROM THE UPPER CRETACEOUS OF FAXE, DENMARK.

By HENRY WOODWARD, LL.D., F.R.S., V.P.Z.S., F.G.S.

(PLATE XII.)

IT is, I regret to say, some long time since my friend Miss Caroline Birley placed in my hands the series of Crustacea which she had, with the assistance of Miss L. Copland, collected from the Upper Cretaceous of Faxe, Denmark.

As in the interval, K. O. Segerberg has figured and described many of these species in Sweden,¹ I propose to give a translation of his descriptions of such species as I find to be identical with those in Miss Birley's collection, it being obviously needless to describe them over again.

Miss Birley has favoured me with the following note on the Upper Cretaceous quarry of Faxe, Denmark:—

“Dr. Henry Woodward, having kindly undertaken to report on the Crustacea obtained by Miss L. Copland and myself on two visits to the Upper Cretaceous (Danian) beds of Faxe, Denmark, has asked for a note on the locality, known to English geologists far better by repute than from actual experience.

“Situated in the south-east of the island of Zealand or Seeland, where, though the land is rich and fertile, the scenery is merely pretty with beech-woods and grass meadows, Faxe offers little to the ordinary tourist, and when we were there only three trains daily connected it with Copenhagen, the journey occupying from 2¾ hours to 6¼. There were then three stations with the name of Faxe—Faxe, Faxe Strand (now Stubberup), and Faxe Laderplads—and Faxe being an inland hill, and not an island, as the usual misspelling of the name indicates, we dismounted at the first, and saw opposite, a little hostel, the only visible building. Here a genial couple made us so comfortable, in homely Danish fashion, that I can only add the fact that there *is* a more orthodox-looking inn in Faxe village, a mile or so away. From either end, the quarry is reached in a few minutes walk. Danish is the only language

¹ Geol. Fören. Stockholm, 1900.

spoken, but a little of it goes a long way with the intelligent and friendly people.

“Approaching the quarry from the north, the low green hill rises before one like a high railway embankment, and on entering by an upland path, or through the cutting for the transport railway, one finds that a large portion of the hill has already been excavated, in a shape between the letter L and a high boot narrowed at the top. The greatest length, about half a mile, is from east to west, and the cliffs or walls which practically surround the quarry, rise to heights varying from 60 to 80 feet. The character of the rock ranges from a compact creamy or pale yellow limestone, used for building purposes, to ordinary white chalk, coral occurring in large masses in this ancient coral-reef. Unfortunately I have no notes of the sequence of the beds, and probably the zones have not yet been worked out. The fossils of most frequent occurrence are the coral *Cladocora dichotoma*, carapaces of *Dromiopsis rugosa*, and casts of *Nautilus (Hercoglossa) danicus* and *Trochus lævis*. *Baculites Faujussii*, always mentioned as characteristic of this deposit, must be more frequent or better preserved in the ‘Faxelaget’ of Stevns Klint and the island of Moen. If we met with it at all in Faxe, it was rarely. The prevalence of Gasteropods is a marked feature, and among the more striking of our acquisitions are a *Voluta* allied to *V. Lamberti* and a large *Pleurotomaria*. The shells almost always occur as casts.

“Fallen boulders of pink granite may occasionally be noticed in the quarry, and one at least was then *in situ* near its northern entrance.”—*C. Birley*.

The youngest member of the Cretaceous formation of Scandinavia is the Danian of Faxe (spelt incorrectly ‘Faxoe’ by Darwin,¹ Prestwich, and others). This stage is wanting in England, but has its equivalent in the Danian and Maestrichtian systems of Belgium and Holland, and the Calcaire Pisolitique and Calcaire à *Baculites* of France. According to Prestwich it is from 45 to 50 feet thick, and consists almost entirely of fragments of corals and Polyzoans (Bryozoa), with *Nautilus Danicus*, *Belemnitella mucronata*, *Baculites Faujussii*, *Cypræa bullaria*, etc.²

K. O. Segerberg³ writes:—“The lower layer of the Faxe Chalk is composed of compact or hard tubular limestone, largely composed of corals, hence called coral-chalk. Here and there one finds a lighter and less compact bed almost wholly composed of Bryozoa. Both the coral-chalk and the Bryozoa-chalk are very rich in fossils, contrasting in this respect with the Saltholms Chalk, which is a more homogeneous, and in its upper layer looser, chalk-rock, formed under other conditions than the Faxe Chalk, which is the remains of an old coral-reef.”

¹ Charles Darwin described some remains of Cirripedia (*Pollicipes striatus*, *P. elegans*) from Faxe (incorrectly spelt Faxoe), Denmark: Pal. Soc., 1851, pp. 70, 76. It is, I regret, spelt ‘Faxoe’ on the Plate accompanying this paper.—H. W.

² Prestwich’s “Geology,” 1888, vol. ii, pp. 7 and 302.

³ “De Anomura och Brachyura Dekapoderna inom Skandinavians Yngre Krita”: Geol. Fören. I Stockholm Förhandl., 1900, Bd. xxii, H. 5, p. 1.

In Miss Birley's collection there is (in addition to various portions) an entire carapace of *Galathea* which agrees best with *Galathea muiridoides*, K. O. Segerberg (Pl. XII, Fig. 8). I have also referred to this species the small detached chela (Pl. XII, Fig. 9). I mentioned the carapace of *Galathea* in my second year's Anniversary Address to the Geological Society of London.¹

The subjoined descriptions have been most obligingly translated for me by Mr. C. A. Ryman, from Mr. K. O. Segerberg's paper "De Anomura och Brachyura Dekapoderna inom Skandinavien Yngre Krita."²

MACROURA—ANOMALA.

Fam. GALATHEIDÆ, Dana.

- 1888. *Galatheidæ*, Henderson : Anomura, p. 116.
- 1894. *Galathéidés*, Milne-Edwards et Bouvier : Galathéidés, p. 191.
- 1897. *Galathéidés*, Milne-Edwards et Bouvier : Dredging by "Blake," xxxv.

One often finds both in the coral-chalk and the Bryozoan-chalk fragments or casts of carapaces with those peculiar cross striæ which are characteristic of the different genera of this family. Steenstrup had already noticed these, and created the species *Galathea strigifera*. Lundgren was the first who attempted to describe and illustrate such fragments. Along with these Crustacean remains are found small claws, which from their size, flat form, and finely serrated edges agree with the type peculiar to this family. Von Fischer-Benzon was the first who noticed and identified these claws. This is all that is mentioned about the fossil representatives of this group in the earlier literature. In 1897 Moericke has contributed some valuable information on the genus *Galathea* in "Die Crustaceen der Sternberger Schichten." In this are recorded no less than four species of this family from the youngest Jurassic formation, all, however, of a type alien to the Danian. We may also refer to Pelseneer (Decapod. du Maestricht, p. 166) and Ristori (Crost. Pliocen, p. 36).

When studying the collections from Faxe in the Mineralogical Museum at Copenhagen, K. O. Segerberg says, "I was fortunate enough to find amongst the matrix of Bryozoan-chalk several well-preserved specimens with the rostrum in more or less good condition. By means of this material I have also been able to give a complete description of *Galathea strigifera*, Steenstrup." [This species is not represented in Miss Birley's collection.]

GALATHEA STRIGIFERA, Steenstrup, sp.

- ? *Galathea strigifera*, Steenstrup, sp.
- 1866. " " Von Fischer-Benzon : Das Alter d. Faxekalkes, p. 28, pl. v, figs. 4-6.
- 1867. " " Lundgren : Faxekalken, p. 11.
- 1900. " ; " Segerberg : De Anomura och Brachyura Dekapoderna in Skandinav. Yngre Krita, pl. i, figs. 1, 2 ?

¹ Quart. Journ. Geol. Soc., February 21, 1896, vol. lii, p. eviii.

² Geol. Fören. I Stockholm Förhandl., 1900, Bd. xxii, H. 5, pp. 42, 3 plates.

Length (of the specimen in the diagram), 6 mm.; breadth, 4 mm. The greatest breadth is just behind the middle.

Rostrum triangular; its superior surface is concave, with three or four sharp spines on each side, which are directed forwards and diminish in size from before backwards. Anterior margin narrow and a little elevated near the point. Lateral margin curved somewhat outwards behind the centre, and provided anteriorly with small pointed teeth which are directed forwards, and of which the anterior one is a little larger than the rest. The occipital sulcus and its branches are shallow. The surface of the carapace is characterized by more or less well-marked cross-lines, of which the two anterior ones are drawn out into a short point directed forwards and the posterior ones run from side to side. Between these, as well as on the rostrum, the surface is more or less granulated. Cardiac region more or less prominent, and in some specimens provided with a sulcus in front.

This species varies in this respect, that the teeth on the rostrum are sometimes fairly large, and sometimes are very minute, needle-shaped, and nearly invisible.

Regarding the carapace, *G. strigifera* shows a great similarity with *G. strigosa* (found in the North Sea), and is perhaps a precursor of this form.

This species occurs abundantly both at Annetorp and Faxø.

The following species of *Galathea* is in Miss Birley's collection:—

GALATHEA MUNIDOIDES, K. O. Segerberg. (Pl. XII, Figs. 8, 9.)

(Figures enlarged 4 times nat. size.)

K. O. Segerberg: Geol. Fören. I Stockholm Förhandl., 1900, Bd. xxii, H. 5, pl. i, fig. 5.

This species is represented by two rather incomplete specimens, preserved as casts, both from Faxø. The length of the specimen figured in Pl. XII, Fig. 8 is 7 mm., the breadth about 4.5 mm.

The rostrum is narrow and triangular, its superior surface smooth and slightly concave, the borders are smooth and provided on each side of the base with a tooth directed forwards. The anterior margin of the rostrum is fairly well raised; the lateral margin is curved in front of and behind the antero-lateral branch of the occipital furrow, but is otherwise straight with indistinct, blunt teeth. The occipital furrow and its branches are well marked. The cross-lines are elevated, and run posteriorly from side to side in a way peculiar to this species. The cardiac region is not prominent. The gastric region anteriorly is sharply distinguished from the frontal region, which is situated on a lower level; in the centre it is provided with a ridge which is continued on to the rostrum. On both sides of this ridge, a little behind the front border, are four small prominences arranged in a semicircle and diminishing in size outwards.

This species exhibits, particularly in the form of its rostrum, an interesting transitional form between the genera *Galathea* and *Munida*. The triangular form of the rostrum and its superior

surface being slightly concave show its relationship to *Galathea*, and on the other hand the non-serrated ridges and the two teeth situated at the base on either side are found in the *Munida*-type, which is represented by *Munida primæva*, n.sp.

Several existing species are known which, as regards the formation of the rostrum, are transitional forms between *Galathea* and *Munida*, which, however, have been arranged as separate genera. Such are the *Pleuroncodes* of Stimpson and the *Grimothea* of Dana. In both these genera one finds a small, triangular, non-serrated rostrum, provided with teeth on each side at the base.

*Pleuroncodes*¹ differs, however, both from *Galathea* and *Munida*, amongst other peculiarities, in its breadth. Recent authors² consider *Grimothea* to belong to the genus *Munida*. Of the living species of *Galathea*, *G. pusilla*, Henderson,³ is nearest to *G. munidoides*; but its rostrum is provided with a small tooth on each side in front.

MUNIDA PRIMÆVA, K. O. Segerberg.

K. O. Segerberg: Geol. Fören. I Stockholm Förhandl., 1900, Bd. xxii, H. 5, p. 8, pl. i, fig. 6.

Only one specimen of this species has been found from Faxø, preserved as a cast; still, the shell can be partially seen at the sides, but the rostrum and lateral teeth are broken. The greatest breadth at the centre of the carapace is 5 mm.; the length from the base of the rostrum to the posterior margin is 6 mm. The rostrum is narrow, spear-shaped, provided with a small tubercle on its superior surface, from which runs a fine ridge along the middle line as far as the occipital furrow; at the base of the rostrum there is on each side a pointed tooth.⁴ The anterior margin is well defined on either side of the rostrum, and still more along the lateral margin. The lateral margins are slightly but evenly curved, and provided with small pointed teeth directed forwards; of these the anterior one is much larger than the rest, and forms the demarcation of the angle between the anterior margin and the lateral margin. The occipital furrow and its branches are deep and distinct. The regions on the border are well defined, and are thinly but sharply granulated. Besides this the superior surface shows several ridges, anteriorly alternately longer and shorter, and here and there are small tubercles. The cardiac region is short and broad, with a narrow, straight sulcus in front and behind; it is crossed by three lines, the two anterior ones converging towards the sides. The middle part in front of the occipital furrow forms an oval area pointed towards the sides. On the gastric region, near the middle line, in front, are two tubercles (on the carapace itself there have probably been teeth corresponding to these); outside and below these are smaller, more or less pointed ones (on both the cast and

¹ Ortmann: Arthropoda, p. 1150.

² Milne Edwards: "Crustacés du Cap Horn," p. 32.

³ Henderson: Anomura, p. 121, pl. xii, fig. 1.

⁴ After the original specimen had been drawn it was being still further developed, and in this operation the rostrum was unhappily destroyed.—K. O. S.

the test). A similar form of rostrum, with lateral teeth placed closely together at the base, is also found in recent species of *Munida*, e.g. *M. forceps*, Milne-Edw.¹

Lundgren says, in the description of *Galathea strigifera*, "that the lateral parts, defined by the above-mentioned curved lines, are granulated, and that the middle one is most prominent." This shows probably that Lundgren, amongst his specimens of *Galathea*, had also the above described species of *Munida*.

BRACHYURA—ANOMALA.

Fam. DROMIDÆ, Stebbing.

Gen. DROMIOPSIS, Reuss.

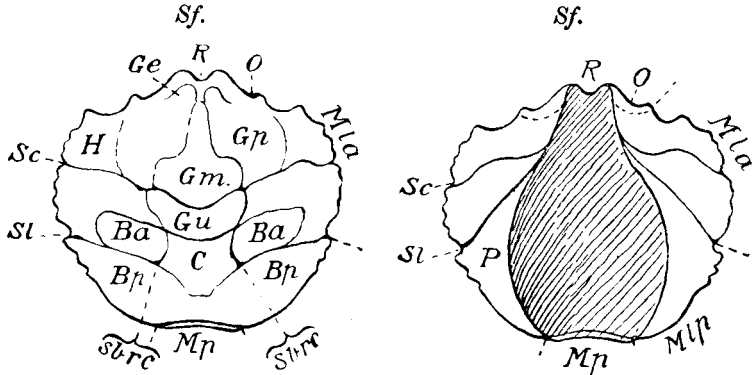
1859. *Dromiopsis*, Reuss: Fossil. Krabben, p. 18.

1866. *Dromia*, Von Fischer-Benzou: Alter d. Faxekalkes, p. 23.

1900. *Dromiopsis*, K. O. Segerberg: Geol. Fören. I Stockholm Förhandl., Bd. xxii, H. 5, p. 9.

The carapace is circular or pentagonal, a little broader than long, much arched in front, flatter behind. The rostrum is triangular and bent downwards, with a shallow sulcus or furrow along the

DIAGRAM OF REGIONS AND DIVISIONS OF CARAPACE IN A BRACHYURAN DECAPOD CRUSTACEAN.



Upper Surface.

<i>Sf.</i>	frontal furrow.
<i>R.</i>	rostrum.
<i>O.</i>	orbis.
<i>Mla.</i>	antero-lateral margin.
<i>Mlp.</i>	postero-lateral margin.
<i>Mp.</i>	posterior margin.
<i>Sc.</i>	cervical or occipital furrow.
<i>Sl.</i>	lateral furrow.
<i>Sbrc.</i>	branchio-cardiac furrow.

Under Surface.

<i>Ge.</i>	epigastric lobe.
<i>Gm.</i>	mesogastric lobe.
<i>Gp.</i>	protogastric lobe.
<i>Gu.</i>	urogastric lobe.
<i>H.</i>	hepatic region.
<i>C.</i>	cardiac region.
<i>Ba.</i>	antero-branchial lobe.
<i>Bp.</i>	postero-branchial lobe.
<i>P.</i>	pterygostomial region.

middle line; its borders are even and raised; the orbits are rather small, somewhat close together, and are open internally towards the rostrum, from which they are only separated by a small ridge of the posterior wall. The inferior orbital border is provided with

¹ Milne-Edwards et Bouvier: Dredging of SS. "Blake," p. 28, pl. ii, fig. 8.

two teeth, of which the external one is the larger. The antero-lateral margins (*Mla.*) are long, much curved, and provided with teeth varying in number and often confluent. The postero-lateral margins (*Mpl.*) are shorter, nearly straight, and curving inwards; they are provided in front with one or two more or less indistinctly marked teeth. The posterior margin (*Mp.*) is generally short and somewhat incurved. The superior surface of the carapace is divided transversely into three areas by two sulci (or furrows), the anterior of which is named the *cervical furrow* (*Sc.*) (called also the occipital furrow), and the posterior the *branchio-cardiac furrow* (*Sbrc.*) or lateral furrow (*Sl.*). The branchio-cardiac furrow is more or less bent backwards, and often takes a sharp curve forwards, and, having received a smaller sulcus from the part in front, it continues on to the arched margin of the carapace forming the lateral furrow (*Sl.*). This sulcus, which marks the middle of the superior surface of the carapace, is indicated only by a notch on the lateral margin over which it passes, and is continued forwards upon the inferior orbital border of the pterygostomial region (*P.*).

Of the different regions observed on the carapace the epigastric (*Ge.*) and the mesogastric lobes (*Gm.*) appear in front of the occipital furrow (also called the cervical furrow) (*Sc.*). The two epigastric lobes (*Ge.*) are nearly always well marked, and are separated by the frontal furrow (*Sf.*). The mesogastric lobe (*Gm.*) is prolonged in front into a narrow point, and divided behind into two parts by a sulcus running lengthwise, and in decorticated specimens, from which the shell has been dissolved away, this furrow is always well defined by two well-marked raised surfaces (these marks being due to the insertion of muscles on the interior of the carapace). Behind the occipital furrow (also called the *cervical furrow*), in the front part of the centre of the carapace, is the broad urogastric lobe (*Gu.*) (not always well defined). This is separated from the next region by a narrow, plane or concave surface. The cardiac region (*C.*) is pentagonal, with the pointed portion directed backwards, and on decorticated specimens nearly always marked by three tubercles, forming a triangle; on each side, behind the occipital furrow, are the two large branchial regions (*Ba.* and *Bp.*). The anterior branchial regions (*Ba.*), situated in front of the lateral sulcus or furrow, possess on decorticated specimens, in the centre, a pointed elevation. The posterior branchial regions (*Bp.*) are of a more or less marked rhomboidal form. Two tubercles can always be seen in decorticated specimens in the middle of the occipital furrow. The pterygostomial region (*P.*) is very narrow. On this, behind the lower border of the orbit, is a transverse furrow or sulcus, which is often sharply marked, particularly on the inner part, where the region behind is more or less pointed.

The superior surface is granulated or smooth, the curved part nearly always smooth. In the collections both from Annetorp and Faxø there are isolated well-preserved claws, which in their short, stout form and the direction of the index and pollex resemble the

Dromia-type, but which are devoid of the denticulations peculiar to *Dromia*. These claws belong, no doubt, to representatives of the genus *Dromiopsis*, which is so stated in one case (cf. *D. laevior*); among others of the figured species one is granulated in the same way as the shell of *D. rugosa*, and belongs probably to that species.

Of the genus *Dromiopsis* four species are already described, all belonging to the newer Chalk formation, and all except *D. elegans* known only from the Faxe Chalk. *Dromiopsis gibbosus*, Schlüt.,¹ from the *Belemnites mucronatus* Chalk formation of Westphalia, does not belong to this family, but ought probably to be referred to the family *Homolopsis* of Bell.

Dromiopsis resembles in many respects *Dromia*, and Von Fischer-Benzon considered these two to be identical. Lundgren is also of the same opinion. This is easily explained, as the genus *Dromia* formerly comprised many more types than are now included with our present knowledge of the genus. (Ortmann, "Arthropoda," p. 114.)

"After examining recent specimens in the Zoological Museum of Copenhagen I have been able to show distinct generic differences between *Dromia* and the genus *Dromiopsis* as proposed by Reuss. *Dromia* differs very distinctly from *Dromiopsis* by its three-toothed rostrum, and also by its long, nearly straight posterior border, much larger pterygostomial region, and its very peculiarly serrated claws. The genus *Dromiopsis* ought thus to be maintained and to be considered as a precursor of *Dromia*. This last-mentioned genus appears first in the Tertiary period, from which Bittner² has described several types all with the rostrum three-toothed. But as regards the pterygostomial region these Tertiary species of *Dromia* resemble *Dromiopsis* (cf. Bittner, 'Brachyuren v. Vicenza, Neue Beiträge,' p. 307)."

"The genus *Dromilites* of Milne-Edwards,³ belonging to the Tertiary formation, with which *Dromiopsis* has also been considered as identical, ought necessarily to be revised. The species belonging to this genus differ more or less from *Dromiopsis* by the denticulations on the lateral borders, by more distinct regions, and by the shape of the branchial regions. Zittel's⁴ diagnosis of the relationship both of *Dromiopsis* and *Dromia* is now inapplicable."

DROMIOPSIS RUGOSA, Schlotheim, sp. (Pl. XII, Figs. 3a, b, and 4a-c.)

1820. *Brachyurites rugosus*, Schlotheim: Petrefactenkunde, p. 36, pl. i, fig. 2.
 1851. *Brachyurites rugosus*, Quenstedt: Petrefactenkunde, p. 401, pl. xxxi, fig. 11.
 1859. *Dromiopsis rugosa*, Reuss: Fossil. Krabben, p. 10, pl. iii, figs. 2, 3; pl. v, fig. 6.
 1866. *Dromia rugosa*, Von Fischer-Benzon: Alter d. Faxekalkes, p. 24, pl. iii, figs. 1-3.
 1867. *Dromia rugosa*, Lundgren: Faxekalken, p. 10.
 1900. *Dromiopsis rugosa*, Schlotheim, sp.: K. O. Segerberg, Geol. Fören. I Stockholm Förhandl., Bd. xxii, H. 5.

¹ Schlüter: Krebse d. nördl. Deutschl., p. 610.

² Bittner: Brachyuren v. Vicenza, Neue Beiträge, p. 306, pl. i, fig. 5; Decapoden d. pannon. Tertiär, pp. 21, 25, pl. ii, figs. 5, 6.

³ Bell: "Crust of London Clay," p. 27, pl. v, figs. 1-9; pl. vi.

⁴ Zittel: Palaeont., ii, p. 703.

The carapace in outline is of a rounded pentagonal form, with its greatest breadth a little anterior to the middle; of nearly the same length as breadth (1 : 1.1); very convex, particularly anteriorly, the posterior part being flatter and often having a depression in the centre. In size it varies from a breadth of a few millimetres up to 40 mm.; generally it is from 20 to 25 mm. The rostrum (*R.*) is strongly depressed; the orbits (*O.*) are deep; their inferior border forms a blunt process with two teeth. The antero-lateral margin commences with a sharp tooth somewhat below the inferior orbital border; in other respects the lateral margins agree generically. The posterior margin is sometimes short and much curved, in others long and less curved; this is probably due to difference in sex. The occipital and lateral sulci or furrows are deep and sharply defined; somewhat broader on the superior surface than on the curved part. On the inner half of the anterior branchial regions there runs parallel to these a much shallower middle sulcus, which forms a right angle externally and ends in the lateral furrow (on some specimens there are traces of such a curved furrow going off anteriorly towards the occipital or cervical furrow). The epigastric lobes form two pointed eminences. The mesogastric lobe is well defined, and elevated posteriorly. The proto-gastric lobes are not so well defined in this type. The urogastric lobe is characterized by irregular eminences. Between this and the cardiac region there is a saddle-like depression, the anterior part of which, towards the sides, blends with the above described middle sulcus. The centre of the cardiac region is more or less elevated, and anteriorly it is externally defined by the branchio-cardiac furrow, which on some specimens is shallower, and runs forwards and outwards and unites with the occipital or cervical furrow. The superior surface is ornamented with granules varying in size, which become less posteriorly and are not so well defined (except on the nearly smooth sulci). The inferior surface has granules only on its anterior part.

The above described details are readily seen on all decorticated specimens and are present on even very small specimens; on larger and older examples they have often been more or less obliterated. Specimens with the surface of the shell well preserved are not rare; the granules in these are very distinct, and do not diminish in size posteriorly, and are seen also on the arched part of the carapace.

Dromiopsis rugosa is not only without doubt one of the most common decapods of the Faxe Chalk, but also generally one of its most common fossils.

Of this little varying type Segerberg records having found the following different forms (see Pl. XII, Figs. 4a-c, $\times 2$ nat. size).

(*a*) *Forma inflata*, small, more strongly and more uniformly arched, with the regions less markedly distinguished; several specimens. (Segerberg, op. cit., 1900, pl. i, fig. 10.)

(*β*) *Forma angusta*, small, strongly arched from side to side; somewhat longer than broad, quickly tapering behind the occipital furrow towards the very short posterior margin. The posterior part of the mesogastric lobe separated by a well-marked sulcus from

the protogastric lobes, which are pointed downwards and inwards. This is probably a variety of *D. rugosa*. (Segeberg, op. cit., 1900, pl. i, fig. 2.)

(γ) *Forma nodosa*, large, with its middle lobes much accentuated and elevated (particularly the posterior part of the mesogastric lobe and the inner half of the antero-branchial regions); the protogastric lobes on the antero-lateral border are also elevated. (K. O. Segeberg, op. cit., 1900, pl. i, fig. 12.)

DROMIOPSIS MINOR, Von Fischer-Benzon, sp.

1866. *Dromia minor*, Von Fischer-Benzon: Alter d. Faxekalkes, p. 25, pl. iii, figs. 4-6.
 1867. " " Lundgren: Faxekalken, p. 11.
 1900. " " K. O. Segeberg: Geol. Fören. I Stockholm Förhandl., Bd. xxii, H. 5, pl. i, fig. 14.

Circumference nearly round; the breadth is to the length as 16 : 15; the arching is fairly uniform all over, but a little flatter posteriorly. The size varies from 15 to 27 mm. in breadth. The rostrum is broad, triangular, and not so much depressed as in *D. rugosa*. The lateral margins are evenly curved; the antero-lateral margin begins close to and on the same level as the inferior orbital border, and has 5-6 short conical teeth, generally well separated. The postero-lateral margin anteriorly is marked by a tooth. The posterior margin is longer and less curved than in *D. rugosa*. The occipital furrow is fairly deep, forming an angular bend on the pterygostomial region. Lateral furrow shallow. The different regions much less prominent than in the preceding species. The cardiac region is defined anteriorly by a fine straight line.

The superior surface sparsely provided with small, mostly pointed tubercles, forming a row on each side of the lateral furrow. The cardiac region and the postero-branchial lobes are provided with much fewer tubercles, or they are absent altogether. In other respects it corresponds with *D. rugosa*.

This species, described by Von Fischer-Benzon, was by him supposed to be identical with *D. minuta* of Reuss.¹ The description by Reuss, however, is very vague, differing little from *D. elegans* as this species is described and illustrated by Reuss² himself, and it is therefore probably only a form of this very variable species from which he has formed his description. *D. minuta*, Reuss, ought thus to be abolished.

D. minor appears rarely both at Annetorp and at Faxe.

DROMIOPSIS ELEGANS, Steenstr. et Forchh., sp.

- ? *Dromilites elegans (elegantulus)*, Steenstr. et Forchh. MS.
 1859. *Dromiopsis elegans*, Reuss: Fossil. Krabben, p. 15, pl. iv, figs. 1, 2.
 1859. *Dromiopsis minuta* (?), Reuss: Fossil. Krabben, p. 13, pl. iv, fig. 3.
 1866. *Dromia elegans*, Von Fischer-Benzon: Alter d. Faxekalkes, p. 26, pl. iv, fig. 2.
 1867. " " Lundgren: Faxekalken, p. 11.
 1900. " " K. O. Segeberg: Geol. Fören. I Stockholm Förhandl., Bd. xxii, H. 5, pl. i, figs. 16, 18, 19.

¹ Reuss: Fossil. Krabben, p. 13, pl. iv, fig. 3.

² Op. cit., p. 15, pl. iv, figs. 1, 2.

This species is very variable in form, but the following characters seem to be fairly constant:—

The circumference is more or less elliptical; the ratio between the length and the breadth is generally as 1 : 1.2; the arching often less than in the preceding species, particularly across the posterior part. The size varies from 5 to 20 mm. in breadth. The lateral margins are provided with small, often indistinct teeth, 7-8 in number. The lateral furrow is shallow, but distinct, being defined behind by a small raised border which is generally noticeable even behind the cardiac region. The posterior part of the mesogastric region and the epigastric lobes is well marked and elevated; the last-mentioned are elliptical and situated transversely. The limit anteriorly being often indistinct. On some specimens the anterior angle seems to run out into a fine line, which ends in a small tubercle.

Of this species two types can be distinguished. One of these particularly is more arched posteriorly, and a little broader than long, with the largest breadth a little in front of the middle of the carapace. The posterior margin is short, strongly curved, and nearly smooth. The second type is broader, with its greatest breadth over the middle. The posterior margin is long and faintly curved; it is more or less granulated, the granules being small, thinly and irregularly scattered. Both types, however, pass by many intermediate forms into each other, and seem to appear just as frequently, and thus it is impossible to distinguish between a typical specimen and its variety.

D. elegans is fairly common at Faxø, and still more so at Annetorp. This species appears also in Maestrichtien supérieur at Mont de Saint-Pierre and at Ciply.¹

DROMIOPSIS LÆVIOR, Steenstr. et Forchh., sp.

- ? *Dromiopsis lævior*, Steenstr. et Forchh. MS.
 1859. " " Reuss: Fossil. Krabben, p. 16, pl. iii, figs. 4-6.
 1866. *Dromia lævior*, Von Fischer-Benzon: Alter d. Faxekalkes, p. 27, pl. iv, fig. 1.
 1900. *Dromiopsis lævior*, Steenstrup: K. O. Segerberg, Geol. Fören. I Stockholm Förhandl., Bd. xxii, H. 5, pl. i, fig. 15.

Larger, more strongly and evenly arched than the preceding species. Circumference rounded. The size varies between 25 and 42 mm. The rostrum is broad, triangular, with its borders strongly raised. The orbits are deep. The external angle of the orbit is interrupted by a broad incision which runs outwards into a wide sulcus. The external tooth of the inferior orbital border is considerably larger than the inner one. The antero-lateral margin begins a little below the inferior orbital border, and its teeth are generally confluent, forming a sharp ridge which is divided by the occipital furrow; both serrations are pointed anteriorly and blunt posteriorly. The posterior margin is somewhat curved inwards. Both the occipital furrow and the lateral furrow are shallow; the last-mentioned is broad, defined behind by a sharp crest, which is

¹ Pelseneer: Decapod. du Maestricht, p. 172.

pointed at the lateral margin, and is continued on to the inferior surface. The epigastric lobes are placed transversely and provided with small prominences. Between these and the antero-lateral margin there are some elevated tubercles, arranged in a row. From an area in the middle of the anterior lateral region, which is full of small depressions and nearly circular in shape, another row of similar tubercles runs in a curve backwards and inwards. The mesogastric lobe is only distinct posteriorly by its conspicuously raised surface. The middle area of the antero-branchial lobes is well marked by the dotted elevation already referred to in the description of the genus. Otherwise the surface of the carapace in the cast is quite smooth, and this is also the case when the shell is preserved.

Of this species one specimen appears with the claw belonging to it, although this is incompletely preserved.¹ The shell of this species is smooth, except a few granules on the shortest side; the cast is more or less reticulated. The claw referred to in Segerberg's paper, p. 17, pl. ii, fig. 2 belongs probably to this species. Only rarely met with at Annetorp and Faxe.

DROMIOPSIS? DEPRESSA, K. O. Segerberg, 1900.

1900. *Dromiopsis? depressa*, K. O. Segerberg: Geol. Fören. I Stockholm Förhandl., Bd. xxii, H. 5, p. 18, pl. ii, figs. 3, 4?

Of this species only one specimen was obtained from Annetorp. The rostrum is not preserved. The specimen is decorticated. The form of the carapace is nearly pentagonal; breadth 26 mm. The distance from the superior orbital border to the posterior margin is 24 mm. In front of the lateral furrow the carapace is strongly arched; behind the same it becomes narrower, with the lateral parts depressed. The orbits are small, narrow, and transverse. The two teeth on the inferior orbital border are of nearly equal size. The antero-lateral margins commence in a line with the inferior orbital border; in front of the occipital furrow the margin is marked by a prominence and is curved; behind the same it is prolonged forwards into a tooth or point, but otherwise (as on the postero-lateral margins) it is only faintly marked, and curved inwards. The posterior margin is long and slightly curved. The occipital furrow is very indistinct, particularly in its inner course. The lateral furrow (*Sl.*), on the other hand, is distinct, but very shallow, without any well-defined margin. Behind the cardiac region there is a transverse depression. Otherwise the details of the carapace are fairly similar to the preceding species.

This species is in some respects very similar to *Dromia lator*, a recent form from the West Indies.² But as only one specimen of the former has been found without a rostrum, and as on the whole it is nearly related to *D. lævior*, I have (with some doubt) referred it to the genus *Dromiopsis*.

In the collections from Faxe, K. O. Segerberg has figured a very incomplete specimen, which he thinks is probably a younger form of this species.

¹ K. O. Segerberg: op. cit., pl. ii, figs. 1, 2.

² Loc. cit., fig. 5.

DROMIOPSIS BIRLEYÆ, H. Woodw., sp. nov. (Pl. XII, Figs. 1a, b.)

DESCRIPTION.—Carapace broader than deep (16 mm. broad and 12 mm. deep); antero-lateral border slightly concave; frontal margin prominent, with a central depression. Lateral margins rounded; postero-lateral margin sloping inwards; posterior margin (8 mm.) broad and nearly straight; surface sparsely granulated, but generally smooth; with the exception of the epigastric prominences, and the posterior margin of the mesogastric region, the lobes of the carapace are generally very obscurely defined; the cervical furrow (*Sc.*) is most distinct and is very slightly curved; the lateral furrow (*Sl.*) is faintly rugose, but less distinct than the cervical furrow; at the base of the mesogastric lobe is a short granulated band in front of the cervical furrow, and two small pointed prominences (divided by the median furrow), the points directed backwards, each being marked by a minute tubercle; the cardiac region is depressed and only faintly outlined, its surface being marked by three small equidistant tubercles, two in front and one behind; four small tubercles mark the border of the antero-branchial lobe, and three the antero-lateral border. The two rounded prominences near the anterior border of the epigastric lobes are very distinct. The rostrum, which is rounded, is bent downwards between the orbits, and is deeply indented by the frontal furrow. The orbits are elongated transversely, and are open internally towards the rostrum.

REMARKS.—Two apparently full-sized specimens of this well-marked species (16 × 12 mm.) are in Miss Birley's collection, also one young specimen measuring 9 mm. in breadth by 6 mm. in depth; all three are preserved in hard compact limestone, which contains also traces of the limbs. The species is distinguished by its well-marked form, being broader in proportion to its depth than *D. rugosa*, although specifically they are no doubt nearly related. The rostral and frontal border is less prominent in *D. Birleyæ*, and the posterior margin is wider and straighter than in *D. rugosa*. All three examples have been decorticated.

I dedicate this species to my friend Miss Caroline Birley, who has given so much time and attention to the study of geology and palæontology both at home and abroad, and whose private collection bears testimony to her devotion to science.

FORMATION AND LOCALITY.—Hard Upper Cretaceous Limestone (Danian) of Faxø: coll. Miss Birley.

DROMIOPSIS COPLANDÆ, H. Woodw., sp. nov. (Pl. XII, Figs. 2a, b.)

DESCRIPTION.—Carapace slightly broader than deep (9 × 7 mm.); anterior border semicircular; frontal region broad, depressed; orbits large, prominent, visible from above, and placed somewhat diagonally; enclosed externally, but open towards rostrum; postero-lateral margins contracting rapidly towards the posterior margin, which is narrow, only 3 mm. wide, and emarginate. Cervical furrow distinct; lateral furrow faint, but more strongly marked on the margin of carapace; antero-lateral margin very bluntly dentated or undulated; mesogastric and epigastric lobes slightly prominent; carapace generally smoothly rounded and lobes obscure.

REMARKS.—This is a very well-marked glabrous form and quite distinct in outline from any of the other species; the sides being narrower and contracting posteriorly, and more rounded and depressed in front; with the orbits visible from above, which is not the case in any other species of *Dromiopsis*.

Among the smaller specimens of *Dromiopsis* I have detected a minute, very round, smooth form; the carapace is 6 mm. broad and 5 mm. deep; it agrees generally with the larger example (Figs. 2a, b). The cardiac region in this small specimen is more clearly defined, and has three equidistant tubercles on its surface; the orbits are large and prominent, and the outline of the back is very globular; this latter character is probably due to its being a young individual.

I dedicate this species to Miss Copland, who participated with Miss Birley in her geological labours and collected many of the specimens with her own hands at Faxø.

FORMATION AND LOCALITY.—Uppermost Cretaceous (Bryozoa Chalk), Faxø: original specimens in Miss Birley's collection.

HOMOLOPSIS TRANSIENS, K. O. Segerberg.

1900. *Homolopsis transiens*, K. O. Segerberg: Geol. Fören. I Stockholm Förhandl., Bd. xxii, H. 5, pl. ii, figs. 6-8.

K. O. Segerberg obtained several specimens of this species both from Annetorp and Faxø, preserved as casts, nearly all, curiously enough, without frontal or lateral margins being preserved (cf. Carter, Decapod. Crust., p. 22).

Anteriorly depressed, otherwise nearly even; the length about 22 mm. (on the larger, figured specimen). Rostrum narrow, triangular, and depressed, provided with a small tubercle on each side. Lateral and posterior margins long, straight, elevated into a ridge. Occipital furrow deep and broad at the sides, narrower between the mesogastric and the urogastric lobes, and having two pointed elevations in the centre. Lateral furrow narrow, faintly defined; nearly straight on each side of the middle line; directed outwards and forwards. The different regions are all very conspicuous and limited by deep sulci. The epigastric lobes are marked by two distinct tubercles. One sees three other similar tubercles on the protogastric lobes. The mesogastric lobe is well defined on all sides. The urogastric lobe is pointed at the sides. The cardiac region is pentagonal and elevated. The antero-branchial lobes are divided on the inner side into two parts, of which the superior one is the shorter. The postero-branchial regions are triangular and large; there is a tubercle on the inner posterior part. The superior surface is more or less thinly and irregularly granulated. On a younger specimen (op. cit., pl. ii, fig. 7) similar granules can be seen, particularly on the mesogastric and cardiac lobes. On an older one (op. cit., pl. ii, fig. 6) one sees these granules both on the cardiac and postero-branchial lobes arranged transversely in short rows; on account of this arrangement the casts have a somewhat ridged appearance. Another old specimen, on the contrary (pl. ii, fig. 8), has the posterior part nearly smooth, and the tubercles on

the protogastric lobes are but little conspicuous. (This is also the case with a single specimen preserved in Miss Birley's collection.)

This species is in many respects very similar to *H. Edwardsii*, Bell,¹ from the Gault and Greensand of England, a very peculiar form, to a knowledge of which the late Mr. James Carter² has made some very valuable contributions. In regard to the granulation on the postero-branchial lobes the species from the Uppermost Chalk (here described by Segerberg) is very similar to the Tertiary genus *Dromilites*,³ which is also closely related to *Homolopsis*, and seems thus to be a transitional form between these two genera.

A single, very imperfect carapace is preserved in Miss Birley's collection from the Danian of Faxø.

CARPILIOPSIS.

CARPILIOPSIS ORNATA, Von Fischer-Benzon, sp. (Pl. XII, Figs. 5a, b.)

1867. *Carpiliopsis ornata*, Von Fischer-Benzon, sp.: Alter d. Faxøkalles, p. 28, pl. ii, figs. 1-3.

1900. " " K. O. Segerberg: Geol. Fören. I Stockholm Förhandl., Bd. xxii, H. 5, p. 28, pl. iii, figs. 15, 17, 18?

DESCRIPTION.—The carapace is sub-elliptical, equally convex longitudinally; the lateral margins are acute; the antero-lateral margins are short, rounded, and curved backwards. The postero-lateral margins are longer and are curved inwards. The orbits are oval, and when seen from above marked by emarginations on either side (Pl. XII, Fig. 5a) of a broad, bluntly rounded, and slightly notched rostrum (Pl. XII, Fig. 5b). The posterior margin is narrow and emarginate. The upper surface of carapace is punctate, and ornamented by raised lines and tubercles peculiar to the species; the general surface is very minutely ornamented with microscopic granules.

The mesogastric lobe is marked by two minute tubercles and a small, short, raised line behind, probably affording the only evidence of the presence of the cervical furrow; there is a slight trace of a median ridge and furrow, and a rather larger tubercle marks the centre of each epigastric lobe. One tubercle on either side and a few minute granules scattered over the protogastric and hepatic regions are the only interruption to the otherwise smooth anterior surface of the carapace. The cardiac region bears three minute tubercles, and is enclosed on either side by a lyre-shaped ridge and furrow, which bending back upon itself forms the short lateral furrow.

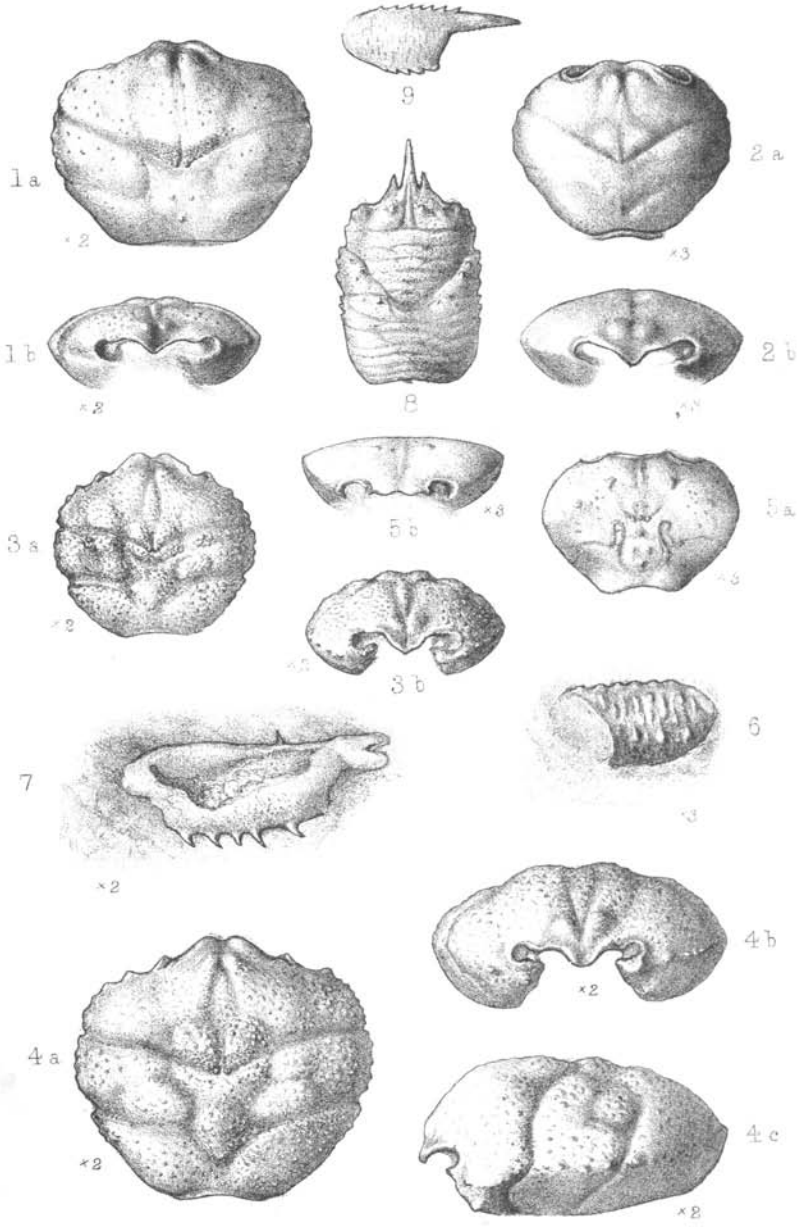
REMARKS.—This well-marked form is represented by two examples in Miss Birley's collection, the larger measuring 12 mm. in breadth by 7 mm. in depth, the lesser example being 9 mm. broad and 6 mm. in depth. Both are from the uppermost Cretaceous formation of Faxø, Denmark.

The following is a list of the species of Crustacea from Faxø recorded by K. O. Segerberg and H. Woodward:—

¹ Bell, Crust. of Gault and Greensand: Mon. Pal. Soc., 1862, p. 23, pl. v, figs. 1, 2.

² Carter: Decapod. Crust., 1898, p. 21.

³ Bell: Crust. of London Clay, p. 27.



GMWoodward } del. & lith.
B.Potter.

West, Newman imp.

Cretaceous Crustacea from Faxoe.

GALATHEIDÆ.

- Galathea strigifera*, Steenstr. Danian : Annetorp and Faxø.
 „ *munidoides*, K. O. S. Danian : Faxø.
 * *Munida primeva*, K. O. S. Danian : Faxø.

DROMIACEA.

- * *Dromiopsis rugosa*, Schlüt., sp. Danian : Faxø.
 „ *minor*, Von Fischer-Benzon, sp. Danian : Annetorp and Faxø.
 „ *elegans*, Steenstr. et Forchh., sp. Danian : Annetorp and Faxø.
 „ *lavior*, Steenstr. et Forchh., sp. Danian : Annetorp and Faxø.
 „ *depressa*, K. O. S. Annetorp and Faxø.
 * „ *Birleyæ*, H. Woodw., sp. nov. Danian : Faxø.
 * „ *Coplandæ*, H. Woodw., sp. nov. Danian : Faxø.
 * *Plagiophthalmus pentagonalis*, K. O. S. Faxø.
 * *Homolopsis transiens*, K. O. S. Annetorp and Faxø.

RANINOIDEA.

- Raninella Baltica*, K. O. S. Faxø.

OXYSTOMATA.

- Necrocarcinus senonensis*, Schlüt., sp. Annetorp and Faxø.
 „ *insignis*, K. O. S. Annetorp.
 „ *bispinosus*, K. O. S. Saltholm's Chalk : Limhamn.

CYCOMETOPA.

- Titanocarcinus*, sp. Annetorp.
 * *Carpiliopsis ornata*, Von Fischer-Benzon, sp. Annetorp and Faxø.
Xanthilites cretaceus, K. O. S. Annetorp.
Panopeus faxensis, Von Fischer-Benzon, sp. Annetorp and Faxø.
 „ *subellipticus*, K. O. S. Faxø.
 „ *incertus*, K. O. S. Annetorp and Faxø.

NOTE.—Those marked by a * are represented in Miss C. Birley's collection.

EXPLANATION OF PLATE XII.

CRUSTACEA FROM THE UPPERMOST CHALK ('DANIAN') OF FAXØ, DENMARK.

- FIG. 1.—*Dromiopsis Birleyæ*, H. Woodward, sp. nov. × 2 times nat. size.
a, dorsal aspect of carapace or cephalo-thorax.
b, frontal aspect of carapace, showing orbits and rostrum.
 „ 2.—*Dromiopsis Coplandæ*, H. Woodward, sp. nov. × 3 times nat. size.
a, dorsal aspect of carapace.
b, frontal aspect of carapace, showing orbits and depressed rostrum.
 „ 3.—*Dromiopsis rugosa*, Schlotheim, sp. Small, round, much granulated variety. × 2 times nat. size.
a, dorsal aspect of carapace.
b, frontal aspect of carapace, showing arched form of carapace and depressed rostrum.
 „ 4.—*Dromiopsis rugosa*, Schlotheim, sp. Typical, most abundant form. × 2 times nat. size.
a, dorsal aspect of carapace.
b, frontal aspect of carapace, showing rounded form of back.
c, side view, showing inflated form of frontal region and strongly marked, transverse cervical and lateral furrows.
 „ 5.—*Carpiliopsis ornata*, Von Fischer-Benzon, sp. × 3 times nat. size.
a, dorsal aspect of carapace, showing the peculiar lyre-shaped markings on the centre enclosing the cardiac region.
b, frontal aspect of carapace, showing the broad blunt rostrum which widely separates the small orbits.
 „ 6.—Portion of a chela. × 3 times nat. size.
 „ 7.—Portion of a chela. × 2 times nat. size.
 „ 8.—*Galathea munidoides*, K. O. Segerberg. Dorsal aspect of cephalo-thorax. × 4 times nat. size.
 „ 9.—*Galathea munidoides*, K. O. Segerberg. Penultimate joints of chela. × 4 times nat. size.