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Glypheoid lobsters, *Glyphea (Glyphea) muensteri* (Voltz), from the Oxfordian deposits of the Central Polish Uplands

ABSTRACT: The glypheoid lobsters, *Glyphea (Glyphea) muensteri* (VOLTZ), previously unknown in Poland, are reported from the Oxfordian deposits (Plicatilis and Bimammatum Zones) of the Polish Jura and Holy Cross Mts. This species, well-known from the Oxfordian of northwestern Europe, occurs in Poland in the sponge megafacies, and it is confined to inter- and/or extrabioherm facies areas.

INTRODUCTION

The glypheoid lobsters, relatively common in the Oxfordian deposits of northwestern Europe, have never been reported from Poland. Extensive research on the Upper Jurassic deposits in the Central Polish Uplands during the last two decades yielded numerous remains of decapod crustaceans, primarily the prosoponids (*see* BARCZYK 1961, WIŚNIEWSKA-ŻELICHOWSKA 1971, RADWAŃSKI 1972, FÖRSTER 1977, COLLINS & WIERZBOWSKI 1985).

The species *Glyphea muensteri* (VOLTZ, 1835) is most abundant and well preserved in the Oxfordian (Cordatum Subzone) of the *"terrain à chailles"* of the Franche-Compté, eastern France, where it is associated with *Glyphea regleyana* (DESMAREST) and *Eryma ventrosa* (v. MEYER). The both glypheoids, *Glyphea muensteri* and *Glyphea regleyana*, are closely related and have been described repeatedly from this area (DESMAREST 1822, v. MEYER 1840, ETALLON 1861, OPPEL 1862, BEURLEN 1928, MARTIN 1961).

The Oxfordian deposits of the Central Polish Uplands which yield the investigated glypheoid lobsters are exposed throughout the Polish Jura and the south-western margin of the Holy Cross Mts (Text-fig. 1).

These deposits are developed exclusively as carbonate rocks which primarily are limestones and less commonly marls and marly clays. All are closely related in their lithology, facies and faunal content to those of the Upper Jurassic strata of the Swabian and Franconian Alb as well as of the Jura Mts, the regions of which, in Late Jurassic, were situated at the northern Tethyan shelf. At that time, the carbonate sponge-megafacies dominated over that shelf, and it was stretching from Spain to Romania (MATYJA 1976, TRAMMER 1982, GAILLARD 1983).

The Oxfordian deposits of the Polish Jura and the south-western margin of the Holy Cross Mts are featured by the same facies diver-

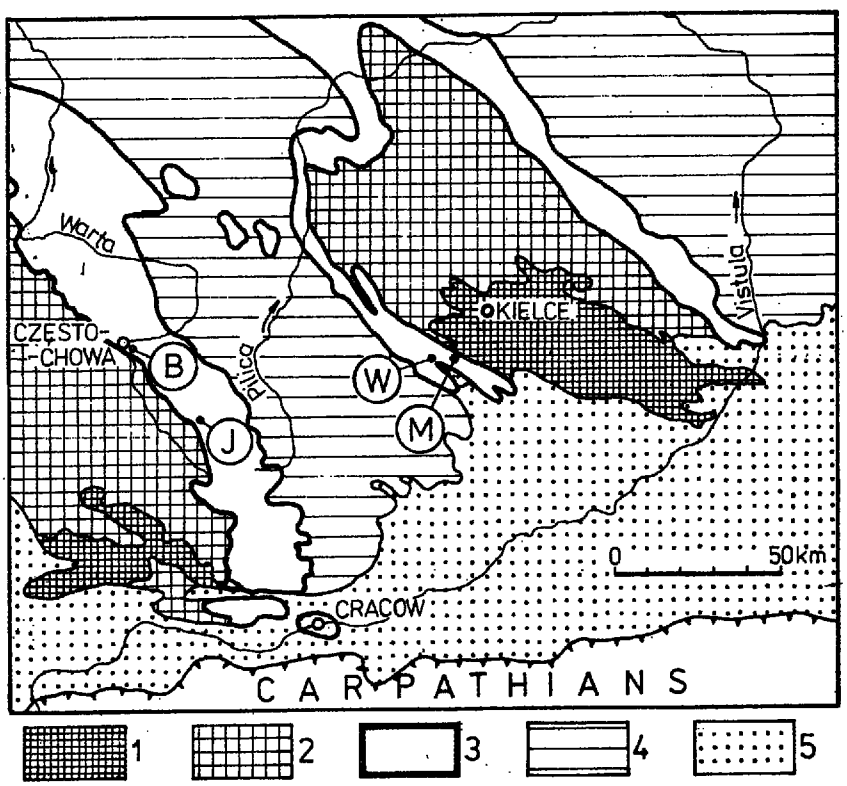


Fig. 1. Geological map of the Central Polish Uplands (*after* ZNOSKO 1968)
1 Paleozoic, 2 Mesozoic (older than Upper Jurassic), 3 Upper Jurassic, 4 Cretaceous, 5 Fore-Carpathian Depression (marine Miocene)
Letters in circles denote location of the investigated exposures: B — Bleszno, J — Jaworznik, W — Wolica, M — Morawica

sity, the intensity of which varies in particular parts of the succession (MATYJA 1977, KUTEK & *al.* 1978). The most contrasted are: *(i)* organogenic limestones (boundstones) making up sponge biostromes, isolated bioherms, or bioherm complexes (200—300 m thick) composed of cyanobacteria-sponge limestones; *(ii)* layered pure limestones, marly lime-

stones and marls (mudstones and wackestones). The bioherm rise was one of the most important factors which controlled the bottom morphology of the Oxfordian basin.

In the Polish Jura the two specimens of these lobsters were found in the poorly fossiliferous layered limestones at localities Błeszno and Jaworznik (Text-fig. 1). These limestones (up to 10 m thick) laterally pass into the layered and non-layered sponge limestones (Text-fig. 2). The stratigraphic range of the poorly fossiliferous layered limestones comprises the upper part of the Cordatum Subzone (Lower Oxfordian) and the lower part of the Plicatilis Zone, *i.e.* the Tenuicostatum and

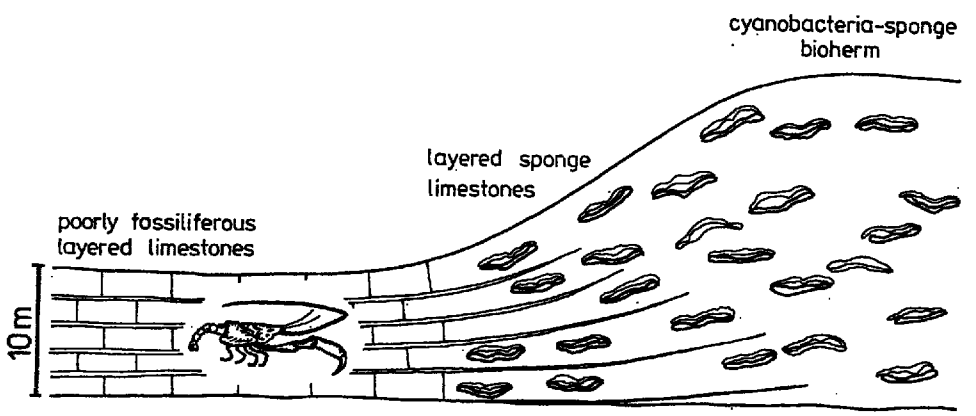


Fig. 2. Diagrammatic sketch illustrating a local relation between the bioherm and extrabioherm facies in the earliest-Middle Oxfordian of the Polish Jura

Antecedens Subzones (Middle Oxfordian). These limestones are developed as a sequence of thin- and medium-layered, gray-colored limestones (wackestones), commonly interfingering with thin (up to 5 cm) layers of marly clays. A scarce benthic macrofauna consists primarily of terebratulids and lamellibranchs. More common are diverse burrows, both parallel and vertical to stratification.

In the south-western margin of the Holy Cross Mts the glypheoid lobsters occur in the Morawica Limestones, developed as a sequence of medium- and thick-layered limestones (wackestones), containing numerous tuberoids and larger putroids of a patchy shape. As the benthic macrofauna siliceous sponges and brachiopods, both terebratulids and rhynchonellids are noted. The topmost part of the Morawica Limestones (Hypselum Subzone) interfingers with the Main Massive Limestones developed as the cyanobacteria-sponge bioherms (Text-fig. 3). This very part of the Morawica Limestones exposed at localities Morawica and Wolica (*see* Text-fig. 1) has provided the two hereafter described specimens of *Glyphea muensteri* (VOLTZ).

The deposits which yield the investigated glypheoid lobsters, although of different age and paleogeographic setting, represent soft bottom areas located amidst and/or outside the sponge bioherms.

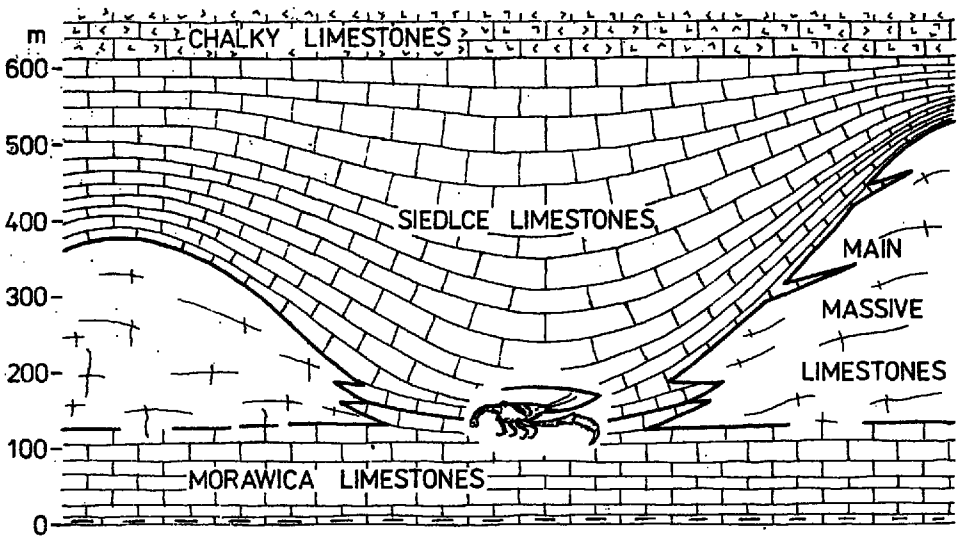


Fig. 3. Diagrammatic sketch of the facies relationships in the Oxfordian basin on the south-western margin of the Holy Cross Mts

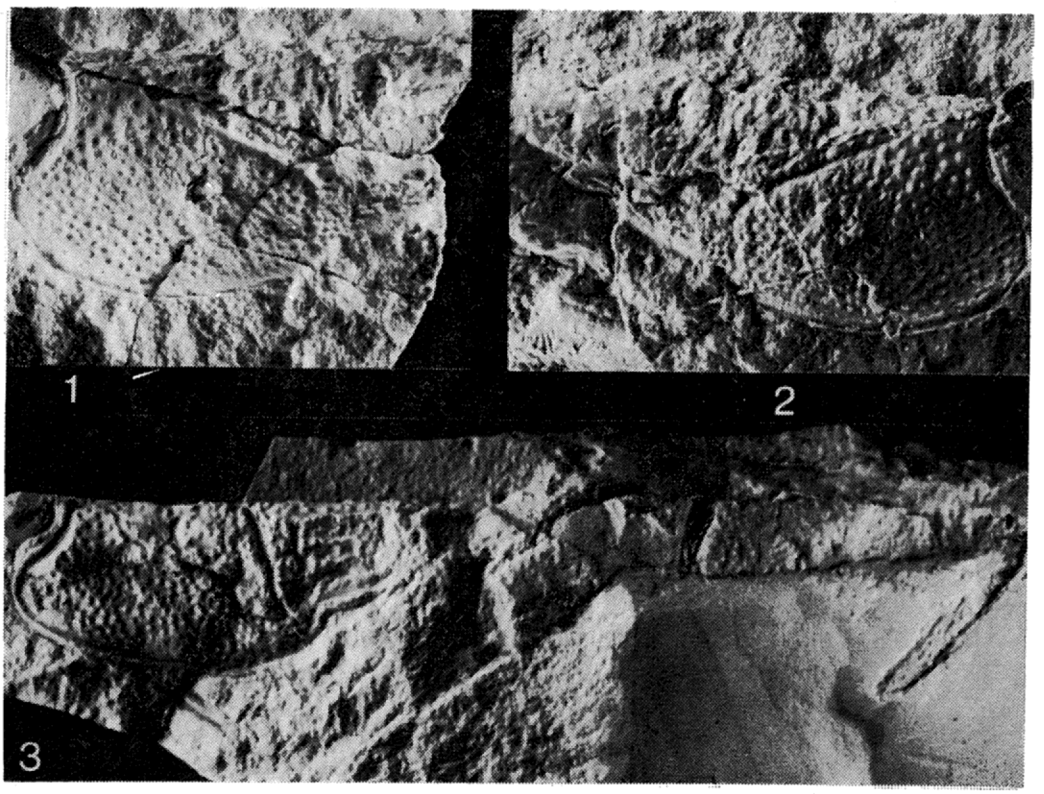
SYSTEMATIC ACCOUNT

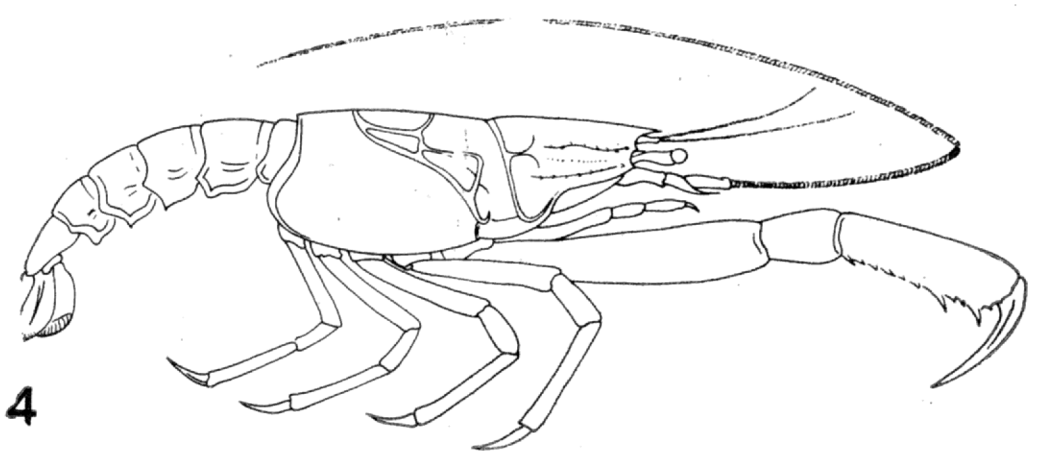
Infraorder **Palinura** LATREILLE, 1803
Superfamily **Glypheoidea** WINCKLER, 1883
Family **Glypheidae** WINCKLER, 1883
Genus *Glyphea* v. MEYER, 1835
Glyphea (Glyphea) muensteri (VOLTZ, 1835)
(Pl. 1, Figs 1-3 and Pl. 2, Figs 1-2)

1835. *Palinurus Münsteri*; VOLTZ, p. 62.
1929. *G. Münsteri* (VOLTZ), 1835; GLAESSNER, p. 188 (*with synonymy*).
1942. *G. Münsteri* (VOLTZ); CARDINET, p. 151.
1961. *Glyphea münsteri* VOLTZ 1835; MARTIN, p. 52, Text-figs 9-12 and Pl. 1, Figs 1-2.
1961. *Glyphea pseudomuensteri* n. sp.; MARTIN, p. 58 and Text-fig. 13.

MATERIAL: Four carapaces; housed at the Institute of Geology, University of Warsaw; Catalogue No. IGPUW/C/2/1-4.
MEASUREMENTS (*in* mm): are given in Table 1.
LOCALITIES and HORIZONS: Specimen No. IGPUW/C/2/1 — Jaworznik (Polish Jura), Tenuicostatum Subzone, Plicatilis Zone; IGPUW/C/2/2 — Bieszno (Polish Jura), lower part of the Antecedens Subzone, Plicatilis Zone; IGPUW/C/2/3 — Morawica (Holy Cross Mts), Hypselum Subzone, Bimammatum Zone; IGPUW/C/2/4 — Wolica (Holy Cross Mts), Hypselum Subzone, Bimammatum Zone.

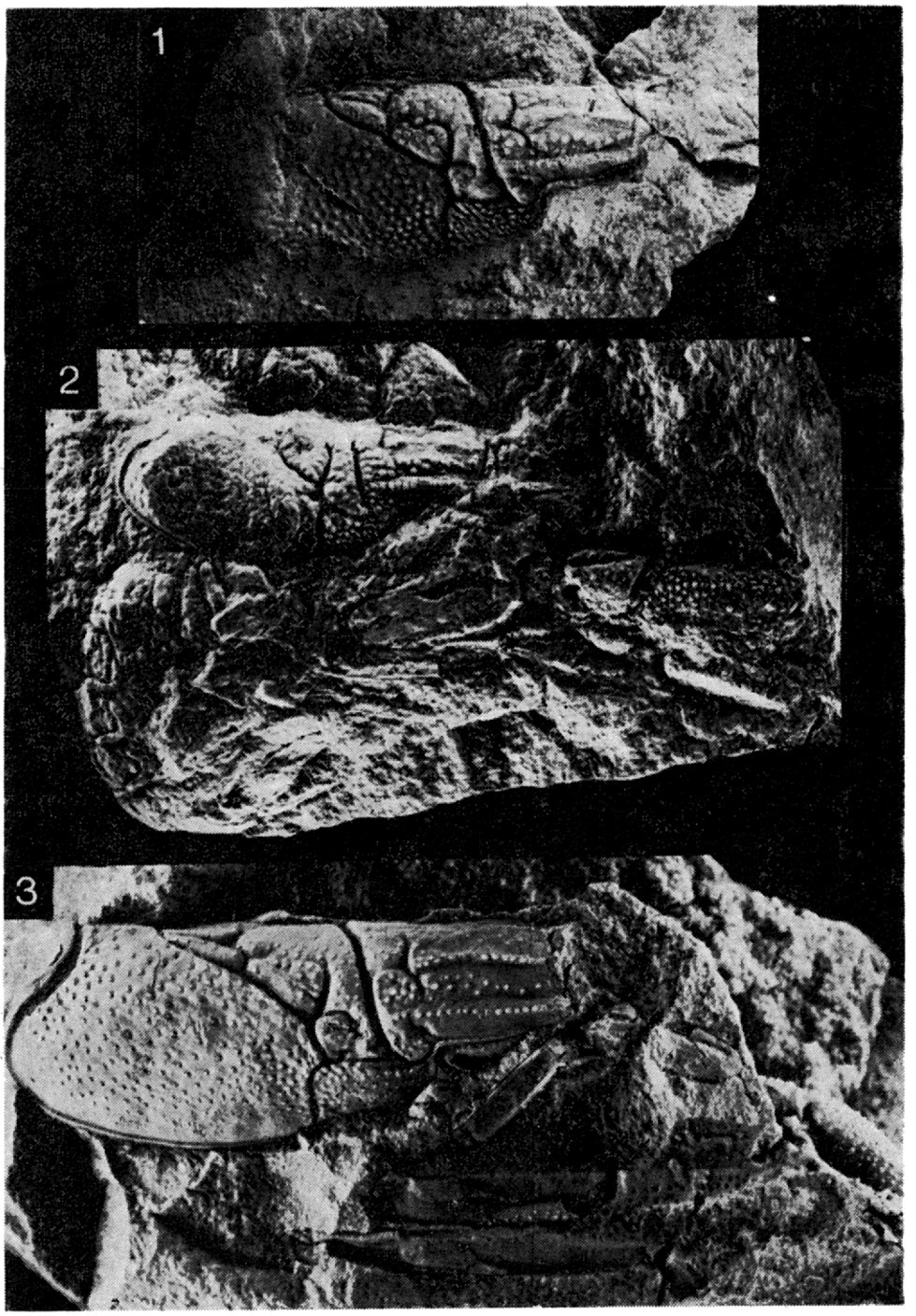
REMARKS: The fossil record of the genus *Glyphea* ranges from the Lower Lias to the Eocene, but that of the nominative subgenus *Glyphea* is much shorter.





Glyphea (Glyphea) muensteri (VOLTZ, 1835)

1 — Mold of posterior part of cephalothorax; Tenuicostatum Subzone, Plicatilis Zone, Jaworznik, Polish Jura; Institute of Geology, University of Warsaw; Catalogue Number IGPUW/C/2/1; × 2
2 — Cast of the same specimen
3 — Cephalothorax and first pereiopod; Hypselum Subzone, Bimammatum Zone, Morawica, Holy Cross Mts; Catalogue Number IGPUW/C/2/3; × 2
4 — Reconstructed complete specimen of *Glyphea (Glyphea) muensteri* (VOLTZ)


1
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Catalogue number	C_l	C_h	R	G	Ca	Cp	B	Tb	bb_1	M	Cp	Pp	D
IGPUW/C/2/1	34	17	5	17	6	6	5	11	5	--	--	--	--
IGPUW/C/2/2	26	13	3	13	5	5	3	8.5	3.8	--	--	--	--
IGPUW/C/2/3	25	11	3.5	12	4.6	4.9	3.5	8	3.6	25	7	22	15
IGPUW/C/2/4	22	10	>2	10.2	4.1	4.3	3.4	~7	3.4	16	6	14	>7

Table 1

C_l — length of cephalothorax, C_h — height of cephalothorax, R — length of rostrum, G — length of gastric region, Ca — length of anterior cardiac region, Cp — length of posterior cardiac region, B — length of dorsal branchial region, Tb — distance hepatic groove dorsal midline, bb_1 — width of hepatic region; M — merus, Cp — carpus, Pp — propodus, D — dactylus

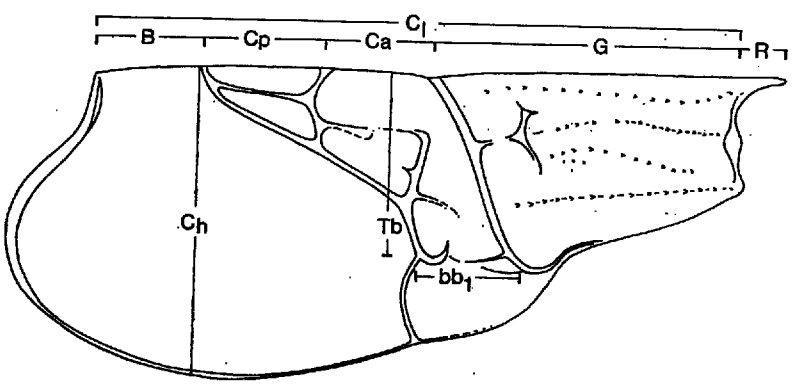

Fig. 4. Measurements taken on the cephalothorax of *Glyphea (Glyphea) muensteri* (VOLTZ); the abbreviations are keyed to the measurements given in Table 1

PLATE 2

Glyphea (Glyphea) muensteri (VOLTZ, 1835)

1 — Cephalothorax, right half; lower part Antecedens Subzone, Plicatilis Zone, Bleszno, Polish Jura; Catalogue Number IGPUW/C/2/2; × 2

2 — Lateral view of the complete specimen; appendages, internal skeleton and abdomen are displaced in a characteristic moulting position; Hypselum Subzone, Bimammatum Zone, Wolica, Holy Cross Mts: Catalogue Number IGPUW/C/2/4; × 2

Glyphea (Glyphea) regleyana (DESMAREST, 1822)

3 — Right half of carapace with proximal parts of pereiopods; specimen figured by OPPEL (1862, Pl. 17, Fig. 1) and BEURLEN (1928, Pl. 7, Fig. 1); Oxfordian, Cordatum Zone, Fretigney, Haute-Saône, France; Bayerische Staatssammlung für Paläontologie und historische Geologie; Catalogue Number BSP AS I 1009; × 2

A reexamination of many type specimens and a study of other materials indicate a range from the Lower Pliensbachian (*G. gussmanni* SCHÜTZE) to the Upper Albian (*G. carteri* BELL) with less than 10 species. Minimal changes in the pattern of the grooves and the sculpture, and furthermore the fragmentary nature of most of the species aggravates a definitive differentiation of the individual species.

Although fragmentary, the four Polish specimens conform well with several carapaces to hand from the *"terrain à chailles"*. Proportional measurements agree reasonably well with those taken from the French material and with the data presented by MARTIN (1961) for *G. muensteri* and *G. regleyana*. The species *Glyphea pseudomuensteri* MARTIN from the same strata is based on only three specimens and falls within the variability of *G. muensteri*, as given in the synonymy.

A coarser sculpture, a weak line of fine tubercles between and parallel to the suborbital and antennal ridges, and some minor differences in the development of the antennal (*d*), postcervical (*c*) and hepatic (b_1) grooves (*see* Text-figs 4—5) are considered as significant features for a differentiation between the two closely related species, *G. regleyana* (*see* Pl. 2, Fig. 3) and *G. muensteri*, from the *"terrain à chailles"*. A size-frequency distribution in relation to the sculpture and the course of the grooves show, however, that a coarser sculpture and the so-called fourth ridge between suborbital and antennal ridges are the more dominant in smaller individuals. The gastro-orbital groove (*d*) varies from a very indistinct depression to a deep, well-developed groove, dependant on the state of preservation. Differences in preservation seem also to be responsible for an apparent variation in the two other grooves.

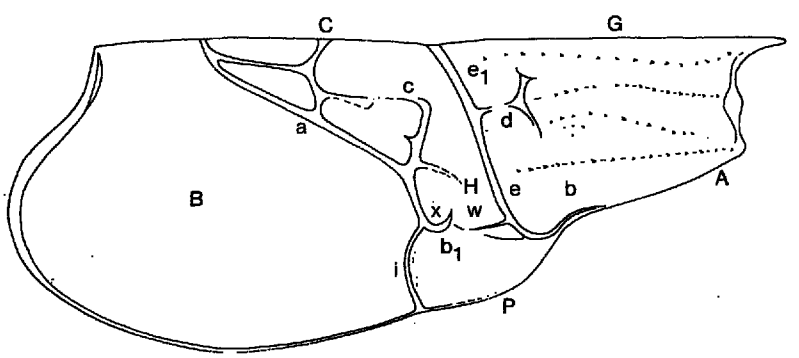

Fig. 5. Descriptive terminology of cephalothorax regions and grooves
A antennal, *B* branchial, *C* cardiac, *G* gastric, *H* hepatic, *P* pterygostomial regions; *a* branchiocardiac, *b* antennar, b_1 hepatic, *c* postcervical, ee_1 cervical, *d* gastroorbital, *i* inferior grooves; *w* articulation of the mandible, *x* attachment area of "adductor testis" muscle

The both species, *G. muensteri* and *G. regleyana*, have been reported together not only from the *"terrain à chailles"* but also from the Oxfordian of northwestern Europe in similar abundance, supporting the suggestion that they really represent the dimorphs. ETALLON (1861) was the first to point to the possibility of sex differences in *G. regleyana*. The first pereiopods ought to be stronger and longer in males, and this is the case of *G. regleyana*.

All four investigated specimens from Poland show the coarse sculpture, the weak line of tubercles between suborbital and antennal ridges and the groove

pattern of *G. muensteri*. Three of them seem to have been preserved as nearly complete skeletons, particularly the small specimen from Wolica (*see* Pl. 2, Fig. 2) which shows the third maxilliped, pereiopods, parts of the endophragmal skeleton with the branchiae, and the abdomen. Appendages, internal skeleton and abdomen are displaced in a characteristic moulting position. All three these specimens have been found lying on their sides. Furthermore the thin brownish cuticle of the cephalothorax shows a network of fine fractures, typical of the early diagenesis of decalcified decapod teguments. The right and left halves of the cephalothorax are laterally compressed. In spite of all these typical features, a definitive interpretation as a moult is not possible, because dead animals disintegrate in nearly the same way. The fourth specimen, from Bieszno, an isolated right half of a cephalothorax (Pl. 2, Fig. 1), is preserved as a steinkern with fragments of the cuticle adhered. It displays the interior and exterior surfaces of the tegument, showing that the inner surface is coarser than the exterior sculpture.

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RAKI *GLYPHEA (GLYPHEA) MUENSTERI* (VOLTZ) Z UTWORÓW OKSFORDU WYŻYN ŚRODKOWOPOLSKICH

(Streszczenie)

Przedmiotem pracy jest analiza paleontologiczna okazów raków z gatunku *Glyphea (Glyphea) muensteri* (VOLTZ, 1835) znalezionych w wapieniach oksfordu odsłaniających się w okolicy Morawicy i Wolicy na południowo-zachodnim obrzeżeniu Gór Świętokrzyskich, a także w okolicy Błeszna i Jaworznika na obszarze Jury Polskiej (*patrz* fig. 1—5 oraz pl. 1—2).

Okazy *Glyphea (Glyphea) muensteri* (VOLTZ) z obszaru Jury Polskiej (pl. 1, fig. 1—2; pl. 2, fig. 1) występują w ubogich w skamieniałości uławiconych wapieniach należących do poziomu Plicatilis oksfordu środkowego. Wapienie te sąsiadują obocznie z uławiconymi wapieniami gąbkowymi oraz z masywnymi wapieniami gąbkowymi (fig. 2). Okazy *Glyphea (Glyphea) muensteri* (VOLTZ) z obszaru Gór Świętokrzyskich (pl. 1, fig. 3; pl. 2, fig. 2) występują w najwyższej części wapieni uławiconych (morawickich) należącej do podpoziomu Hypselum poziomu Bimammatum oksfordu górnego. W tej części przedziału stratygraficznego wapienie morawickie zazębiają się obocznie z wapieniami skalistymi (fig. 3).

Utwory w których występują badane raki, aczkolwiek różnią się pozycją stratygraficzną i geograficzną, reprezentują osady miękkiego dna środowisk położonych na zewnątrz lub pomiędzy biohermami cjanobakteryjno-gąbkowymi.
