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NEW DATA ON FOUR SUBTERRANEAN SPECIES OF THE SUBORDER GAMMARIDEA FROM NEAR EAST REGION

Contribution to the Knowledge of the Amphipoda 201

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The new data on four subterranean species of the Gammaridean *Amphipoda, Metacrangonyx ortali* G. Karaman 1989, *Metacrangonyx sinaicus* Ruffo 1982, *Bogidiella (Bogidiella) copia* G. Karaman 1988 and *Niphargus nadarini* Alouf 1972, from the Near East Region, are presented and figured. The distribution of all these taxa is presented.

INTRODUCTION

The region of Near East (under the general term of Near East we consider the countries of SW. Asia (Turkey, Lebanon, Syria, Israel, Jordan, Saudi Arabia and other countries of the Arabian Peninsula and Sinai Peninsula) is relatively scarce regarding the fresh waters, and very often these continental waters can be more or less brackish (Dead Sea region, some lakes in Asia Minor, etc.).

Despite that, these waters are provided with rich and highly endemic fauna of the subterranean *Amphipoda* (suborder *Gammaridea).*

Schellenberg (1933) described a taxon *Niphargus aquilex tauri* n. sp. (now *N. tauri,* fide G. Karaman, 1973) from Taurus Mt. in Asia Minor.

Stanko Karaman (1950) described two new taxa from Asia Minor: *Niphargus illidzensis orientalis* n. ssp. from Goksy, and *Niphargus anatolicus* n. sp. from Emirgan.

Ruffo (1963) described a new species *Bogidiella hebraea* from spring of Ein Hakikar, in Dead Sea Region.

Stock and Nijssen (1965) described a new species *Eriopisa longiramus* from a Red Sea island Entedebir.

Alouf (1972) described a new species *Niphargus nadarini* from well in Hawsh-Hala, Bekaa plain in Lebanon, and later (1973) he described another new species, *Niphargus altagahizi* from Ras Chehka Cave in Lebanon. He mentioned (1977) a new localities of *N. nadarini* from Bekaa plains.

Ruffo (1974) described semisubterranean species *Synurella osellai*, n. sp. from Tirebolu (Asia Minor), and he redescribed a species *Lyurella hyrcana* Dershavin 1939 based on specimens from Lahidjan in northern part of Iran (Loc. typ. of *L. hyrcana* is Haftali, reg. Talysh in southern part of USSR).

Pinkster and G. Karaman (1978) described a blind species *Gammarus vignai*, n. sp. from cave Camlik Dalayman in Asia Minor.

Ruffo (1979) discovered and described a new genus and species *Phreatomelita paceae* from Shark-E-Kord in Esfasan (Iran).

Ruffo described (1982) the taxon *Metacrangonyx sinaicus*, n. sp. from well in Beer Gideih on Sinai Peninsula.

Karaman, G. (1985) described a new genus and species, *Foroniphargus pori*, from the subterranean waters of N. Dan (N. of Tiberias Lake in Israel).

Later, G. Karaman (1986) mentioned various new localities of *Niphargus nadarini* from Iraq, Israel and adjacent regions, and he described a new species *Niphargus itus* from En Awazin and En Teo in northern part of Israel.

Vigna Taglianti described (1988) a new genus and species *Parhadzia sbordonii* from Antalya in S. Anadolia (Turkey).

G. Karaman (1988) described two new taxa, *Hebraegidiella bromleyana*, n. gen. et sp., and *Bogidiella copia*, n. sp. from Enot Qane in Israel.

Recently also (1988) Ruffo and Vigna Taglianti described *Gammaropisa arganoi*, n. gen. et sp. from Antalya in southern part of Anadolia (Turkey).

G. Karaman described (1989*a*) a new species *Metacrangonyx ortali* n. sp. from Enot Qane (western coast of Dead Sea), giving also (1989*b*) additional data regarding *Bogidiella copia* from Enot Qane.

Recently (1990, in press) G. Karaman described another new species from Beer Gideih on Sinai Pennsula, *Bogidiella stocki*.

Dr. H. J. Bromley and Dr. C. Dimentman from the department of Zoology, Hebrew University of Jerusalem, and Dr. R. Ortal from the Institute of Life Science in Jerusalem, send me very kindly various samples of the subterranean *Amphipoda* for study.

Based on the studies of that material, a new data were obtained regarding several subterranean species of *Amphipoda* from Near East, mentioned here in this work.

Acknowledgements: I am indebted to Dr Heather J. Bromley and Dr Chanan Dimentman from the depertment of Zoology, Hebrew University of Jerusalem, and to Dr Reuven Ortal from the Institute of Life Science from Jerusalem, Israel, for the loan of material used in this study.

TAXONOMIC PART

METACRANGONYX ORTALI G. Karaman 1989
Fig. 4 *A*

Metacrangonyx ortali G. Karaman 1989a : 36, fig. 1 — 6.

Material examined: Western coast of Dead Sea : Enot (= spring) Samar, station 11 B, Dec. 22/23, 1988, 12 spec. (Coll. Hebrew University of Jerusalem) (leg. ?);

— ibid., Sept. 1, 1988, many spec. (Coll. HUJ);

— ibid., Nov. 17/18, 1988, 10 specimens, accompanied by one spec. of *Bogidiella (Bogidiella) copia* G. Karaman 1988 (Coll. HUJ).

Remarks. The specimens in hands agree completely with my previous description and figures of this species (G. Karaman, 1989*a*).

Localities cited: Western coast of Dead Sea: Enot Qane (G. Karaman, 1989*a*); Enot Samar (new).

Loc. typ.: Enot Qane.

Distribution: Known only from western coastal region of Dead Sea in Near East (Fig. 4 *A*).

Ecology: Living in the subterranean brackish (salt) waters; it was found sometimes accompanied by *Bogidiella copia* G. Karaman 1988 and *Hebraegidiella bromleyana* G. Karaman 1989 (G. Karaman, 1988, 1989*b* in Enot Samar and Enot Qane).

METACRANGONYX SINAICUS Ruffo 1982

Fig. 1, 2 *A-C*, 4 *A*

Metacrangonyx sinaicus Ruffo 1982: 151, fig. I — II.

Material examined: NEAR EAST: Desert of Sinai: Beer Gideih (Wadi Watir, cca 50 *Km* SW. of Elat, Israel) (IES 2510 Coll. Inland Water Ecological Laboratory, Jerusalem), Dec. 1, 1981, many spec. (leg. R. Ortal).

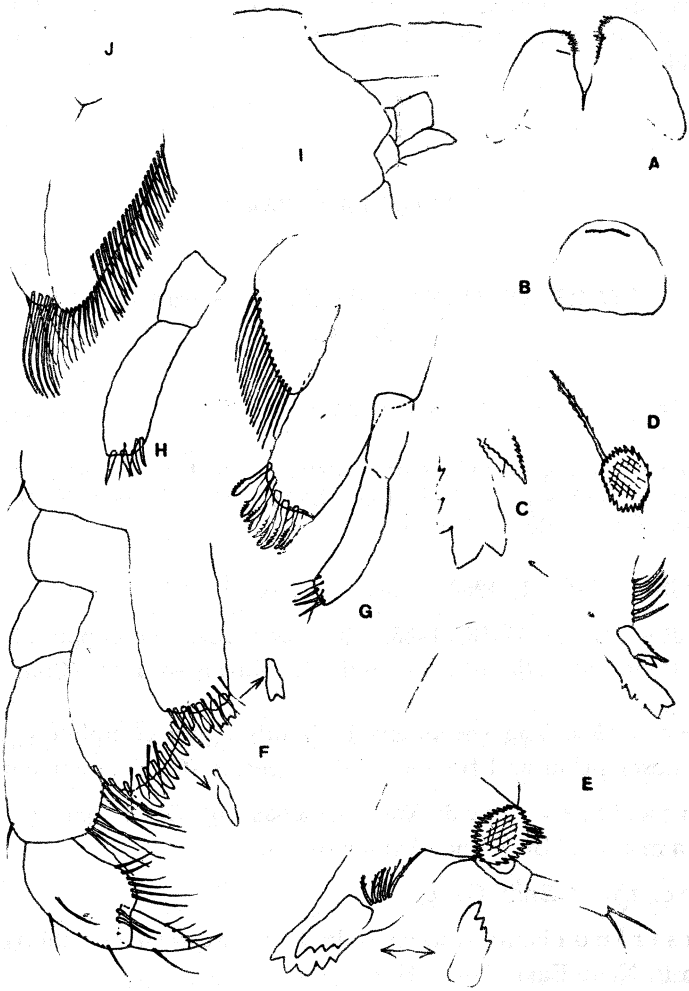

Fig. 1. — *Metacrangonyx sinaicus* Ruffo 1982, Beer Gideih, female 3.9 *mm:* A = labium; B = labrum; C—D = right mandible; E = left mandible; F = maxilliped; G = left maxilla 1; H = palp of right maxilla 1; I = head; J = maxilla 2.

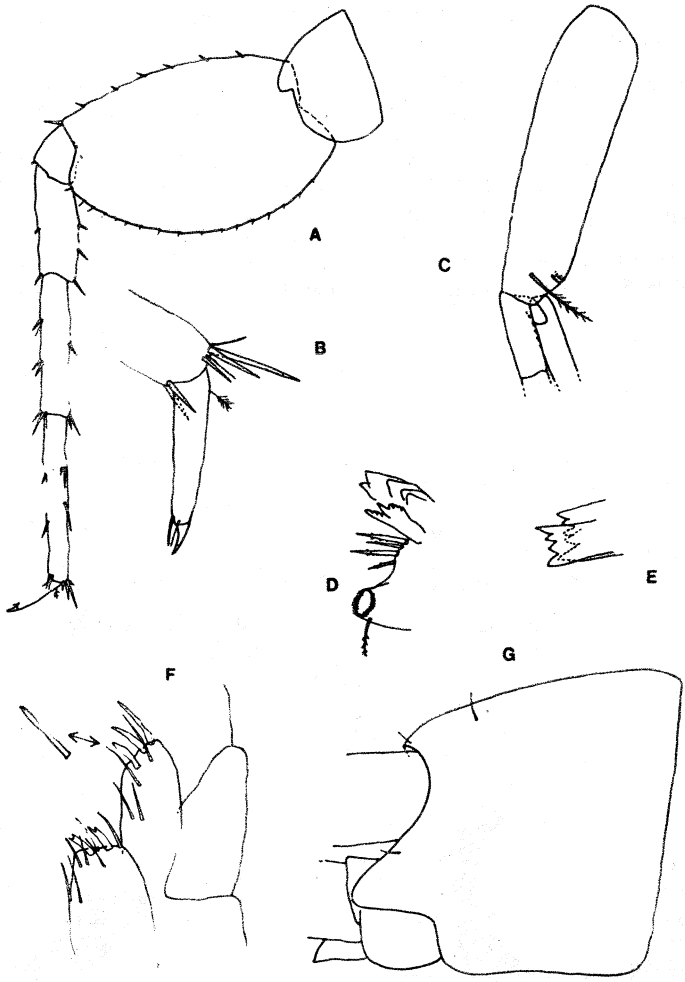

Fig. 2. — *Metacrangonyx sinaicus* Ruffo 1982, Beer Gideih, female 3.9 *mm:* A—B = pereopod 7; C = pleopod 3. *Bogidiella (Bogidiella) copia* G. Karaman 1989, Beer Gideih, female 2.4 *mm:* D = tip of right mandible; E = tip of left mandible; F = plates of maxilliped; G = head.

Description. Ruffo (1982) presented a description and figures of this species, except some mouthparts and some other taxonomical characters which I tried to describe here.

Female up to 3.9 *mm* : Head with short rostrum, lateral cephalic lobes short, subangular, ventroanterior sinus of head developed, angular (Fig. 1 *I*), eyes absent.

Urosomites 1—2 with 1 feeble seta on each side, urosomite 3 with 1—2 setae on each side.

Antenna 1: articles of main flagellum with 1 aesthetasc each; accessory flagellum 3-segmented.

Labrum entire, broader than long (Fig. 1 *B);* labium without inner lobes, outer entire, bearing long marginal setulae (Fig. 1 *A).*

Left mandible: molar triturative, without long lateral seta (Fig. 1 *E),* incisor with 5 distal teeth, lacinia mobilis with 4 teeth; between it and molar appears a row of 5 rakers (Fig. 1 *E).*

Right mandible: molar with long distolateral seta (Fig. 1 *C-D),* incisor with 5 distinct teeth and 1 undistinct weak tooth near base;

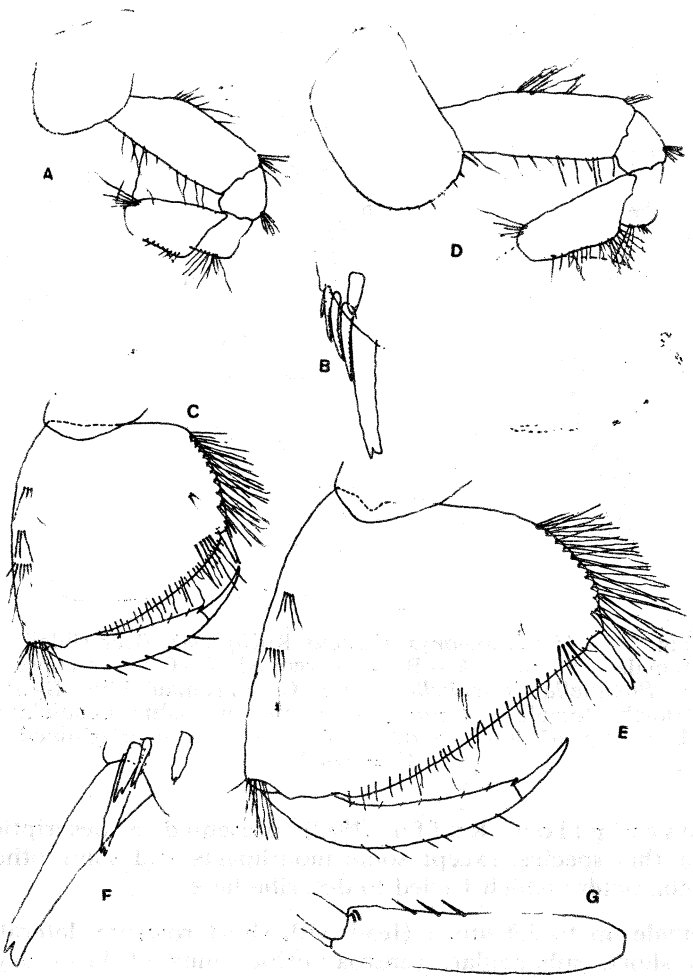

Fig. 3. — *Niphargus nadarini* Alouf 1972, Uyun E-Debsh, female 13 *mm:* A—C = gnathopod 1; D—F = gnathopod 2; G = pleopod 3.

lacinia mobilis consisting of 2 serrate lamellae; between it and molar appears a row of 6 rakers (Fig. 1 *C-D)*. Mandibular palp weak, small, consisting of 2 — 3 linear articles bearing 2 distal setae only.

Maxilla 1: inner plate triangular, with row of distolateral plumose setae (Fig. 1 *G);* outer plate with 11 — 12 pluritoothed (not pectinate) spines. Palp of left mandible is narrow, bearing 3 slender spines and 3 setae (Fig. 1 *G);* palp of right mandible is more dilated, bearing distally 4 stronger spines and 2 setae (Fig. 1 *H).*

Maxilla 2: both plates long, narrowed distally; inner plate with lateral and distal marginal setae and with oblique facial row of setae (Fig. 1 *J),* outer plate with distal and subdistal setae only.

Maxilliped: inner plate long, with 3 — 4 distal excavated spines (Fig. 1 *F),* accompanied by several setae; outer plate slightly exceeding 2/3 of second palp segment, bearing a row of smooth lanceolate distolateral spines (Fig. 1 *F);* palp segment 4 shorter than 3, with short nail and 3 — 4 setae along inner margin, and with 1 seta at outer margin (Fig. 1 *F).*

Coxae 1 — 4 longer than broad; coxa 3 tapering distally, coxa 4 large, lobed; coxae 5 — 7 bilobed, with anterior lobe remarkably smaller than posterior one.

Gnathopod 1: segment 5 longer and larger than 6; segment 6 with transverse palm, dactyl short.

Gnathopod 2: segment 5 shorter than 6; segment 6 linear, long, palm oblique, with row of palmer spines; dactyl exceeding posterior margin of segment 6, with one seta at outer margin.

Pereopods 3 — 4 linear, with short dactyl bearing 1 seta at inner margin.

Pereopods 5 — 6 with segment 2 ovoid, dilated proximally and with short ventroposterior lobe and short posterior marginal setae.

Pereopod 7: segment 2 dilated medially, ventroposterior lobe short, posterior marginal setae short; segments 4 — 6 with spines along both margins. Dactyl of pereopods 5 — 7 with short nail and 1 stronger seta at inner margin (Fig. 2 *A, B),* accompanied by 1 short feeble lateral seta near nail.

Epimeral plates 1 — 3 smoth, epimeral plate 2 produced ventrally.

Pleopods 1 — 3 with 2 retinacula each (no additional setae near retinacula). Peduncle of pleopods 1 — 2 smooth, peduncle of pleopod 3 with 1 strong distolateral external plumose seta (at outer face of peduncle) (Fig. 2 *C).* Peduncle of pleopods 1 — 3 with one distal median finger (Fig. 2 *C).*

Urosomite 1 near basis of peduncle of uropod 1 without any spine or seta. Uropod 1: peduncle with one strong basifacial spine and with dorsoexternal row of spines; dorsointernal row of spines absent (except short distal spine); rami subequal long, bearing several lateral and distal stronger spines each.

Uropod 2: peduncle with dorsal spines; rami subequal, bearing lateral and distal spines.

Uropod 3 very short: peduncle inflated, with one lateral and 2 distal spines; inner ramus vestigal, ovoid, smooth; outer ramus short, 1-segmented, cca 3 times shorter than peduncle, bearing one distal spine.

Telson short, broader than long, bearing two groups of distal and lateral setae (each of these 4 groups is consisting of 1—2 short setae).

Coxal gills ovoid, with peduncle, occur on pereonites 2—6.

Oostegyts occur on pereonites 2—5, narrow.

The males: They are similar to the females except gnathopod 2 having elongated strong segment 6 provided with long convex oblique palm bearing a row of numerous bifid palmar spines; dactyl long, with one seta at outer margin.

Remarks. I mentioned before (1989 *a*) a taxonomic differences between *M. ortali* and *M. sinaicus*. Based on new taxonomic characters of *M. sinaicus* described in this paper, *M. ortali* differs from *M. sinaicus* (besides the differences mentioned in previous paper) also by different pilosity of peduncle of pleopods 1—2 and telson, by poorly excavated lateral cephalic lobes and shallow ventroanterior sinus of head, by different some mouthparts and less spiniferous uropods 1—3.

Loc. typ.: Beer Gideih (Sinai Peninsula).

Localitie cited: Desert of Sinai: Beer (= well) Gideih, cca 550 meters above sea level, cca 50—60 *km* SW. of Elat (26 *km* from coast of Red Sea) (Ruffo, 1982, present work).

Distribution: known only from type-locality.

Ecology: Living in the subterranean waters, sometimes accompanied by *Bogidiella (Bogidiella) copia* G. Karaman 1988 (present work). In the same locality (Beer Gideih) were found also *Bogidiella stocki* G. Karaman 1990 and *Bogidiella copia* G. Karaman 1988 (present work; G. Karaman 1990).

BOGIDIELLA (BOGIDIELLA) COPIA G. Karaman 1988

Fig. 2 *D-G*, 4 *A*

Bogidiella (? Bogidiella) copia G. Karaman 1988 : 41, Fig. 5—8.

Bogidiella (Bogidiella) copia G. Karaman 1989 *b* : 48, Fig. I—II.

Material examined: NEAR EAST: Sinai Peninsula: Beer Gideih (Wadi Watir, 50—60 *km* SW. of Elat (= Eilat), Dec. 1, 1981, one spec. accompained by *Bogidiella stocki* G. Karaman 1990) (leg. R. Ortal) (IES 2510, Coll. Inland Water Ecological Laboratory of Jerusalem);

— WESTERN COAST OF DEAD SEA: Enot Samar, Station 11 *B*, N. of En Gedi, Nov. 17/18, 1988, one spec. accompanied by *Metacrangonyx ortali* G. Karaman 1989 (leg. Bromley and Dimentman) (Coll. Hebrew University of Jerusalem).

Remarks. The present damaged specimen in hands from Beer Gideih as well as that from Enot Samar agree with typical specimens of this species.

Female 2.4 *mm.* Antenna 1 slightly shorter than half of body (1 : 2.4); lateral cephalic lobes of head narrow and slightly produced forward (Fig. 2 *G)*, head with single very short dorsal setae (Fig. 2 *G)*.

Left mandible: incisor with 5 teeth, lacinia mobilis with 4 teeth, molar distinctly triturative, with short distolateral seta (Fig. 2 *E)*, near it appear 4 rakers.

Right mandible: incisor with 5 teeth, lacinia mobilis bifurcate, pluritoothed (Fig. 2 *D);* mandibular palp segment 2 with 1 seta, palp segment 3 with 4 setae.

Maxilla 1: inner plate with 3 setae, outer plate with 7 long spines undistinctly pluritoothed (?), palp 2-segmented, nearly reaching tip of spines of outer plate and bearing 3 distal setae.

Maxilla 2: inner plate with 6 setae (1 plumose seta), outer plate with 9 setae.

Maxilliped: inner plate with 2 distal bifurcate (excavated) spines (Fig. 2 *F);* outer plate short, with 3 distal smooth marginal spines (Fig. 2 *F)* and with smooth distoinferior margin; palp article 3 unlobed, palp article 4 longer than 3, bearing short nail and 2 subdistal ventral setae.

Pleopods 1 — 3 with very short inner ramus (it is shorter than diameter of peduncle of pleopod itself), bearing one long disal plumose seta.

Telson like that in type, each lobe with 1 distal spine only.

Localities cited: Enot Qane on western coast of Dead Sea (G. Karaman, 1988, 1989 *b);* Enot Samar (new); Beer Gideih on Sinai Peninsula (new).

Loc. typ.: Enot Qane.

Distribution: Western coast of Dead Sea: southern part of Sinai Peninsula.

Ecology: This species was found in slightly salt (brackish) subterranean waters, sometimes accompanied by *Bogidiella stocki* G. Karaman, 1990 (Beer Gideih) (present work) or with *Metacrangonyx ortali* G. Karaman 1989 and *Habraegidiella bromleyana* G. Karaman 1988 (G. Karaman, 1988, 1989 *b)*. In the same locality, but not in the same sample, was found *Metacrangonyx sinaicus* also (present work).

NIPHARGUS NADARINI Alouf 1972

Fig. 3, 4 *B*

Niphargus nadarini Alouf 1972: 547, fig. 1—6; Alouf 1977: 59; G. Karaman 1986: 14, fig. I—V; G. Karaman & Ruffo 1986:528.

Material examined: NEAR EAST: Uyun (= spring) E-Debsh, cca 3.5 *km* SE. of Nahal Moisa, April 1, 1986, 21 spec. (leg. R. Ortal) (IES 5079 Amph. 2049—02, Coll. Hebrew University, Jerusalem). The springs are on basaltic cover, the upper drainage basin of Nahal Dalyyot which is streaming to the Sea of Galilea (= Tiberias Lake), altitude 500 *m* above sea level (cca 20 *km* NE. of Galilea Sea, Golan Mts.);

— ibid., IES 5073, Amph. 2049—01, April 4, 1986, 4 spec. juv. (leg. R. Ortal) (Coll. HUJ).

Remarks. G. Karaman (1986) redescribed this species in detail from Israel, Lebanon, Iraq and adjacent regions, and we are giving here only some additional important data.

Fig. 4. — A: Distribution of *Metacrangonyx ortali* (triangle), *Metacrangonyx, sinaicus* (quadrate) and *Bogidiella (Bogidiella)* copia (circle) on Near East.

All known specimens of this species from Lebanon, Israel and adjacent regions (except Iraq) have been known with normal or hardly enlarged segment 6 of gnathopod 2 (Alouf 1972, G. Karaman, 1986).

The specimens I figured (G. Karaman, 1986) from Iraq (Baghdad and Haditha) are with very enlarged (dilated) segment 6 of gnathopod 2 and I have mentioned that these specimens belong to the same species, *Niphargus nadarini,* despite enlarged gnathopod 2 and the locality in Iraq on so large distance from Lebanon (over 600 *km)* through the desert.

Our present discovery of the specimens from the springs in the region of Golan Mts (E-Debsh) with so extremely enlarged segment 6 of gnathopod 2, i.e. the specimens almost identic with these from Baghdad and Haditha, supports our previous conclusions about similarity of the specimens from Iraq with these from Lebanon, Israel and adjacent regions, and their belonging to the same species, *Niphargus nadarini* Alouf 1972.

Short description of some taxonomic characters of specimens from E-Debsh: Mounthparts, including maxilla 1, like these in type specimens, as well as pereopods 3—7, uropods and telson.

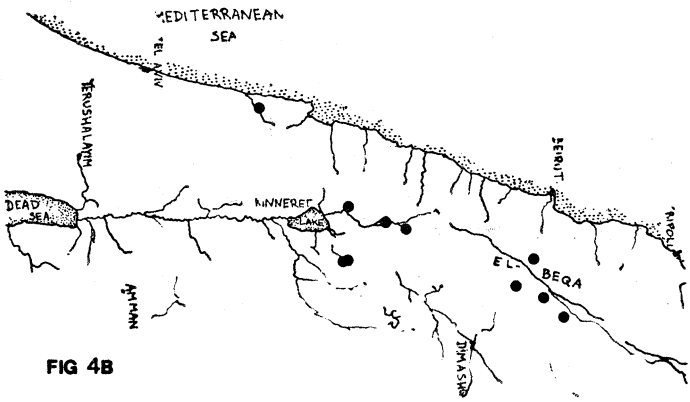

Fig. 4. — B: Distribution of *Niphargus nadarini* Alouf (circle) on Near East (localities in Iraq are omited).

Coxa 1 with ventroanterior marginal spine-like setae (Fig. 3 *A)*, coxa 2 with marginal spine-like setae also (Fig. 3 *D)*.

Gnathopod 1: posterior margin of segment 6 with 9 groups of setae (Fig. 3 *C)*; palm oblique, defined on outer face by one strong corner spine accompanied laterally by 4 slender toothed spines and 5 facial setae (Fig. 3 *A-C)*, on inner face by 1 short subcorner spine (Fig. 3 *B)*; dactyl reaching posterior margin of segment 6, bearing a row of single setae along outer margin (Fig. 1 *C)*.

Gnathopod 2: segmet 6 extremely extended (dilated), along posterior margin with 10 groups of setae (Fig. 3 *E)*; palm very oblique, defined on outer face by one strong corner spine accompanied by 3 more slender shorter spines sitting behind strong spine(Fig. 3 *F)* and by 4 facial setae; on inner face by 1 short subcorner spine (Fig. 3 *F)*; dactyl remarkably shorter, not reaching posterior margin of segment 6 (Fig. 3 *E)*.

Pleopods 1—3 with 2 retinacula each. Peduncle of pleopods 1—2 smooth; peduncle of pleopod 3 along posterior margin with 3 short spine-like setae (Fig. 3 *G)*.

Urosomite 1 with 1 spine on each side, urosomite 2 with 2—3 spines on each side.

Localities cited: Israel and adjacent regions: N. (? Nahal) Dan (Nahal = river); Hule; N. Moisa (G. Karaman, 1986); Uyun (= spring) E-Debsh (SE. of N. Moisa) (present work); En Taron (all N. of Lake Kinneret = Tiberias Lake); Enot Avi (cca 25 *km* SE. of Haifa) (G. Karaman, 1986);

Lebanon: BEKAA (= Beq') plain : wells in village Hawsh--Hala (Alouf, 1972; G. Karaman, 1986); springs of Ras- l'Ayn in Qabb Ilyasispring in Shamsine; well in village Talia (Alouf, 1977);

Iraq: Haditha (= El Hadithah, Euphrates River); Baghdad (Tigris River) (G. Karaman, 1986).

Loc. typ.: Hawsh-Hala, Lebanon.

Distribution: The freshwaters from Lebanon and Israel till Iraq (Persian Guls drainage system).

Ecology: This species was found sometimes accompanied by *Foroniphargus pori* G. Karaman 1985 (in N. Dan, G. Karaman, 1986).

CONCLUSIONS

The freshwater (continental) subterranean fauna of *Amphipoda* (suborder *Gammaridae)* is highly endemic in the region of Near East, where numerous endemic species have been discovered and described during last several years (Ruffo, G. Karaman).

The present distribution of the studied subterranean species in the Near East Region show that these species have been much more widely distributed in tertiar, when quite different climate was present in this region of the World. The present barriers existing between present known various localities of single species have been developed after the settlement of these areal by the studied species, for example *Niphargus nadarini,* known in the subterranean waters belonging to the Mediterranean Sea drainage system, that in Lebanon (Bekaa plains), and in the subterranean waters of Haditha (Euphrates River) and Baghdad (Tigris River) belonging to the Persian Gulf drainage system.

It is interesting that the known subterranean fauna of *Amphipoda* of North Africa is quite different from that of Near East, despite the presence of some common genera *(Metacrangonyx, Bogidiella* s. lato, etc.).

The region of Near East is still poorly known regarding the subterranean fauna of *Amphipoda,* especially the parts of Saudi Arabia, Iran and Asia Minor, where numerous new taxa are waiting to be discovered in the future.

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NOVI PODACI O ČETIRI PODZEMNE VRSTE PODREDA GAMMARIDEA IZ REGIONA BLISKOG ISTOKA

201 prilog poznavanju Amphipoda

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Rezime

Nešto intenzivnija istraživanja faune podzemnih kontinentalnih voda Bliskog Istoka (pod terminom Bliski Istok podrazumjevamo zemlje na jugoistoku Azije: Turska, Liban, Sirija, Izrael, Jordan, Saudijska Arabija i druge zemlje Arabijskog poluostrva kao i Sinajsko poluostrvo) u poslednjih dvadesetak godina (Ruffo, G. Karaman) ukazala su na prisustvo veoma interesantne i endemične faune *(Amphipoda* u tom prostoru i pored relativnog siromaštva u vodama tog regiona.

Istraživanja su obuhvatila četiri vrste Gammaridnih *Amphipoda* u podzemnim vodama: *Metacrangonyx ortali* G. Karaman 1989, *Metacrangonyx sinaicus* Ruffo 1982, *Bogidiella (Bogidiella) copia* G. Ka-

raman 1988 i *Niphargus nadarini* Alouf 1972. Utvrđeni su novi lokaliteti pojedinih vrsta i dati su nepoznati ili slabo poznati taksonomski karakteri nekih od tih vrsta, te mape njihovog rasprostranjenja.

Upravo sadašnje rasprostranjenje ovih vrsta ukazuje da su te vrste imale u prošlosti mnogo šire i kontinuirano rasprostranjenje (vjerovatno u tercijeru), prije pretvaranja tih područja u današnje pustinje i aridne oblasti.

To potvrđuju i nalazi nekih vrsta u sada veoma udaljenim lokavilitima između kojih sada postoje prisutne barijere (npr. prisustvo vrste *Niphargus nadarini* u podzemnim vodama Libana u slivu Sredozemnog mora, i prisustvo iste vrse u podzemnim vodama Iraka, u Bagdadu (Tigris rijeka) i Hadithi (Eufrat rijeka), dakle u slivu Perzijskog zaliva Indijskog oceana.

Slično je i sa rasprostranjenjem vrste *Bogidiella copia* koja je nađena u slivu Mrtvog mora (Enot Samar, zapadna obala Mrtvog mora) i u podzemnim vodama Sinajskog poluostrva, odnosno u južnom dijelu Sinajske pustinje (Beer Gideih, cca 50 *km* jugozapadno od luke Eilat u Izraelu, sliv Crvenog mora).

Daljnja proučavanja podzemnih voda cijelog regiona Bliskog Istoka će vjerovatno dovesti do otkrića mnogih drugih vrsta podzemnih *Amphipoda* i ukazati na geološku prošlost tog regiona i rasprostranjenje nekadašnjih vodenih tokova koji su bili sasvim drugačiji nego što su oni danas.