

A revision of some Asian species of *Microcreagris* Balzan, 1892 (Neobisiidae, Pseudoscorpiones)

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Summary

The accessible Asian species ascribed to the genus *Microcreagris* Balzan have been examined. Only *M. herculea* Beier has been retained, along with *M. gigas* Balzan, in *Microcreagris*. Nine of the described species have been removed from the genus and six new taxa (three genera and three species) have been erected; these are: *Bisetocreagris* n. g., with *B. annamensis* (Beier), *B. parablothroides* (Beier), *B. silvicola* (Beier), *B. furax* (Beier), *B. clapperichi* (Beier), *B. philippinensis* (Beier) and *maritima* n. sp.; *Chinacreagris* n. g., with *C. crinensis* (Beier), *C. kwantungensis* (Beier) and *C. nankingensis* n. sp.; and *Levigatocreagris* n. g., with *L. lindbergi* (Beier) and *L. gruberi* n. sp.

Probable synapomorphic characters for the species have been identified; genital areas, flagella and pedipalpal chelae with their trichobothrial patterns are figured, and brief descriptions of the genera and species examined are given. An identification key for the four genera studied is presented.

Introduction

A number of pseudoscorpion species from Asia have been included, at one time or other, in the long-established genus *Microcreagris* Balzan, 1892, whose type species, *M. gigas* Balzan, 1892, is supposed to inhabit China, i.e. the Tsin Lin Shan Mountain range (Mahnert, 1979). That this should have happened is not surprising, for the early chelonethologists were faced with superficially similar forms that they tended to unite into a single genus. At that time, the evaluation of correlative characters was neglected, hence various unsatisfactory taxonomic decisions concerning *Microcreagris* were made.

Recent studies of a number of the European and North American "*Microcreagris*" species have convinced the present author that there is a real need for a revision of their taxonomic status. The hetero-

geneity of "*Microcreagris*" in Europe, Asia and North America has been confirmed beyond doubt and some light has been shed on the interrelationships between and among groups of species pertaining to *Microcreagris* proper and the allied genera (Mahnert, 1976, 1979; Čurčić, 1975, 1978, 1981, 1982). In the determination of generic limits, anatomical evidence played a significant role, particularly with regard to the distinctions in correlative characters (structure of flagellum, sternal chaetotaxy, dermal structure of pedipalpal articles, chaetotaxy of manducatory process and disposition of trichobothria).

According to the concept presented in this study, *Microcreagris* is a genus of two species confined to China and Afghanistan, respectively. On the other hand, North American forms, otherwise assigned to *Microcreagris*, belong to different and new genera: *Tuberoocreagris* Čurčić, 1978, *Lissoocreagris* Čurčić, 1981 and *Americocreagris* Čurčić, 1982. Outstanding distinctions have been noted between these genera and *Microcreagris* proper; at the present moment, there is no evidence confirming the presence of any *Microcreagris* representative in North America north of Mexico. Therefore, there is a necessity for a complete revision of all North American "*Microcreagris*" species, if not of all neobisiids which have been poorly understood or misidentified ever since their description (Čurčić, 1978, 1981). The same applies to Asian forms, otherwise included in *Microcreagris*.

The genus *Microcreagris* s. str. has been redefined by Mahnert (1979). The aims of the present revision of *Microcreagris* species inhabiting different regions in Asia are twofold: first, to determine the boundaries between *Microcreagris* and three newly erected genera; and second, having formed concepts of these genera, to revise their constituent species. Data for this study were obtained from anatomical preparations made from preserved material. This material consists mainly of holotypes and type series of pseudoscorpions and is the property of the Natural History Museum in Vienna.

A thorough study of the complex of taxonomic characters in *M. herculea* Beier from Afghanistan has been made by Mahnert (1976) as well as by the present author. It has been found that this species belongs in *Microcreagris*, together with *M. gigas*.

Nine of the Asian species included in *Microcreagris*

have been excluded from the genus in the present study. The species excluded fall into three new genera, of which the first comprises the former *M. annamensis* Beier, *M. parablothroides* Beier, *M. silvicola* Beier, *M. furax* Beier, *M. klapperichi* Beier, *M. philippinensis* Beier, and a new species from the USSR. In general, the characters by which these species are distinguished from *Microcreagris* are genus-specific, and these taxa are accordingly transferred to a new genus: *Bisetocreagris*. Furthermore, *M. chinensis* Beier and *M. kwantungensis* Beier are assigned to the new genus, *Chinacreagris*, which contains one other species, *C. nankingensis* sp. nov. Morphologically, these two genera are closely related to each other since they possess a similar pattern of chaetotaxy of the genital area. The features distinguishing these two genera have high taxonomic weight.

The third group of species excluded comprises the former *M. lindbergi* Beier, and a new species from Nepal. Representatives of this group are characterised by conspicuous features which are not shared by the species of the above-mentioned genera. These distinctions appear to be great enough to warrant the separation at generic level of these species, for which the generic name *Levigatocreagris* is proposed.

The results of this study emphasise the outstanding heterogeneity of a part of the "*Microcreagris*"-complex in Asia and, at the same time, make it possible to establish more precise interrelationships of certain pseudoscorpion species which belong to the newly-established genera. These investigations, however, impose the necessity of further confirmation of the taxonomic status of all other Asiatic species included in the genus *Microcreagris*.

Family NEOBISIIDAE Chamberlin, 1930

Genus *Microcreagris* Balzan, 1892

Type species: Microcreagris gigas Balzan, 1892.

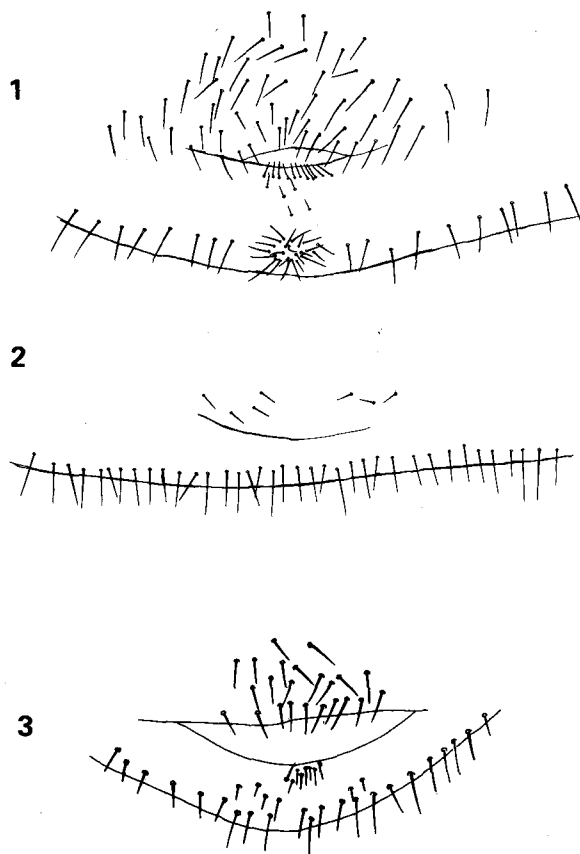
Diagnosis: Carapace longer than broad, surface smooth; four eyes and epistome present; carapacial formula: (4-8)-(10-14), 38-44.

Galea branched; flagellum eight-bladed; all blades pinnate along their anterior margins and of approximately equal size; two distal blades elevated. Fixed cheliceral finger with 7-14 setae, movable finger with one seta.

Pleural membranes granulostriate. Male genital area: sternite II with a posterior and median cluster of setae; sternite III with an anterior transverse row of setae and a central group of elevated and dense setae in middle of posterior setal row (Fig. 1). Female genital area: sternite II with a group of setae on either side of the middle; sternite III with a posterior transverse row of setae (Fig. 2).

Tergites uniseriate; sternites VI and VII with anteromedian discal setae.

Apex of pedipalpal coxa with 5 long setae. Pedipalpal articles granulate. Trichobothriotaxy: *eb* and *esb* separated from each other by approximately 1.5-2 diameters, *esb* distal to *eb*, both tactile setae on base of finger. Setae *it*, *et* and *est* in distal, and *ist*, *isb* and *ib* in proximal part of finger (close to finger



Figs. 1-3: Genital area. 1 *Microcreagris herculea*, male; 2 *M. herculea*, female; 3 *Levigatocreagris gruberi*, male.

base). Seta *st* closer to *t* than to *sb* (Fig. 16).

Tibia IV, basitarsus IV and telotarsus IV with one long tactile seta each.

***Microcreagris herculea* Beier, 1959 (Figs. 1-2, 16)**

Material examined: Paratype female, from "Grotte Sri Tighi oder San-Sorakh bei Kauh-Chigui, Laghman", Afghanistan, 30 January 1958, K. Lindberg leg.; one male from "steinige Schlucht am Grunde der Grotte, Tchidjan bei Cheikabad", 7 April 1958, K. Lindberg leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Carapace longer than broad; epistome triangular or rounded; posterior eyes with more flattened lenses than anterior; a pair of preocular microsetae on either side; carapacial chaetotaxy of female: 4-10, 32, and of male: 4-11, 32.

Pleural membranes granulostriate. Tergal formulae: 12-13-15-16-15-16-16-15-14-13 (female) and 12-17-19-17-18-18-18-17-17-15 (male). Male genital area (Fig. 1): sternite II with a median and posterior group of 57 setae; sternite III with 11 anterior, 5 intermediary and 18 posterior setae, the last interrupted by a group of 23 elevated and dense setae. Sternite III with 7 or 8 small suprastigmal setae on either side. Female genital area (Fig. 2): sternite II with a group of setae on either side of the middle. Sternite III with a posterior row of 37 setae and 7 or 8 microsetae along each of the stigma; sternites VI and VII biseriate: each of them, apart from 18-22 posterior setae, bears two more anterior and discal setae.

Cheliceral galea simple, with 3 (female) or 4 (male) terminal branchlets. Cheliceral palm with 7, and movable finger with one seta. Flagellum eight-bladed, similar to that of *M. gigas* (Mahnert, 1979).

Apex of pedipalpal coxa with 5 long setae. Pedipalpal trochanter insignificantly granulate, femur and chelal palm more conspicuously granulate; tibia smooth (female) or granulate (male). Fixed chelal finger with 70 (male) to 74 contiguous teeth (female), movable finger with 63 (female) or 66 teeth (male). Chelal palm approximately as long as chelal fingers.

Trichobothrial pattern (Fig. 16) and number of tactile setae on leg IV are presented in diagnosis of genus.

Distribution: Afghanistan.

Genus *Bisetocreagris* new genus

Etymology: Referring to the two small setae which occur each on either side of the anteromedian groove of sternite III in the male.

Type species: *Microcreagris annamensis* Beier, 1951.

Diagnosis: Carapace longer than broad; epistome small and rounded; four eyes; carapacial formula: 4-(5-9), 20-29.

Cheliceral palm with 6 or 7 setae, movable finger with one seta; flagellum seven- to nine-bladed, the most distal blade dilated basally and not far from other blades. Subdistal blades of nearly equal size; subproximal blades diminish in size from distal to proximal; the most proximal blade is the shortest. All flagellar blades pinnate along their anterior margins (Figs. 8-10). Galea branched.

Male genital area (Figs. 4, 5): sternite II with a cluster of median and posterior setae; sternite III with a bisetous median groove in the form of a V on its anterior border, followed by a row of irregularly placed intermediary setae and by a series of posterior setae. Female genital area: sternite II with a group of setae on either side of the middle; sternite III with a posterior row of marginal setae. Tergites and sternites uniseriate; pleural membranes granulostriate.

Manducatory process with 4 (occasionally 5) acuminate setae. Pedipalpal articles with granulations which can also be quite insignificant. Trichobothriotaxy: *eb* and *esb* on bulb of chela, separated from each other by approximately 2 diameters, *esb* not distal to *eb*. Setae *ib*, *isb* and *ist* on base of finger, *est* closer to *it* than to *ist*; *st* closer to *t* than to *sb* (Figs. 17-19).

Leg IV: tibia, basitarsus and telotarsus with one long tactile seta each.

***Bisetocreagris annamensis* (Beier, 1951) (Figs. 5, 8, 17)**

Microcreagris annamensis Beier, 1951

Material examined: Holotype female, and four paratypes (two females and two males) from the Plateau of Langbian, Vietnam (South Annam), mission of C. Dawydoff to Indochina in 1938/39, C. Dawydoff leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Epistome tubercular; four eyes with

flattened lenses, posterior eyes spot-like; two pre-ocular microsetae on either side. Carapacial chaetotaxy: 4-(5-6), 20-21. Thus, Beier's assumption (1951) that the carapacial chaetotaxy is 6-4, 30 is incorrect.

As opposed to the claim (Beier, 1951) that "Abdominaltergite und Sternite mit je 10 Borsten", I have established that tergite I carries 6 setae in both sexes; tergite II with 6-8 setae, tergites III-X with 8-12 setae each. Male genital area: sternite II with a median and posterior group of 26 scattered setae; sternite III bears an anteromedian bisetous groove, followed by an intermediary row of 4 setae, and by a series of 10 marginal, i.e. posterior setae. Female genital area (Fig. 5): sternite II bears a group of 4-5 small setae on either side of the middle; sternite III has 9-11 posterior setae.

Galea of the female has two branches, with 3 or 4 terminal branchlets on each branch; in the male, galea is unbranched and carries 5 terminal branchlets. Fixed cheliceral finger with 6 or 7 (female), or 7 setae (male), movable finger with one. Flagellum seven- or eight-bladed (Fig. 8).

Manducatory process with 4 long and acuminate setae. All pedipalpal articles robust and smooth; only the chelal palm is granulate. Fixed chelal finger with 56-59 teeth, movable finger with 64-66 close-set teeth. Trichobothriotaxy (Fig. 17) and number of tactile setae on leg IV are described in diagnosis of genus.

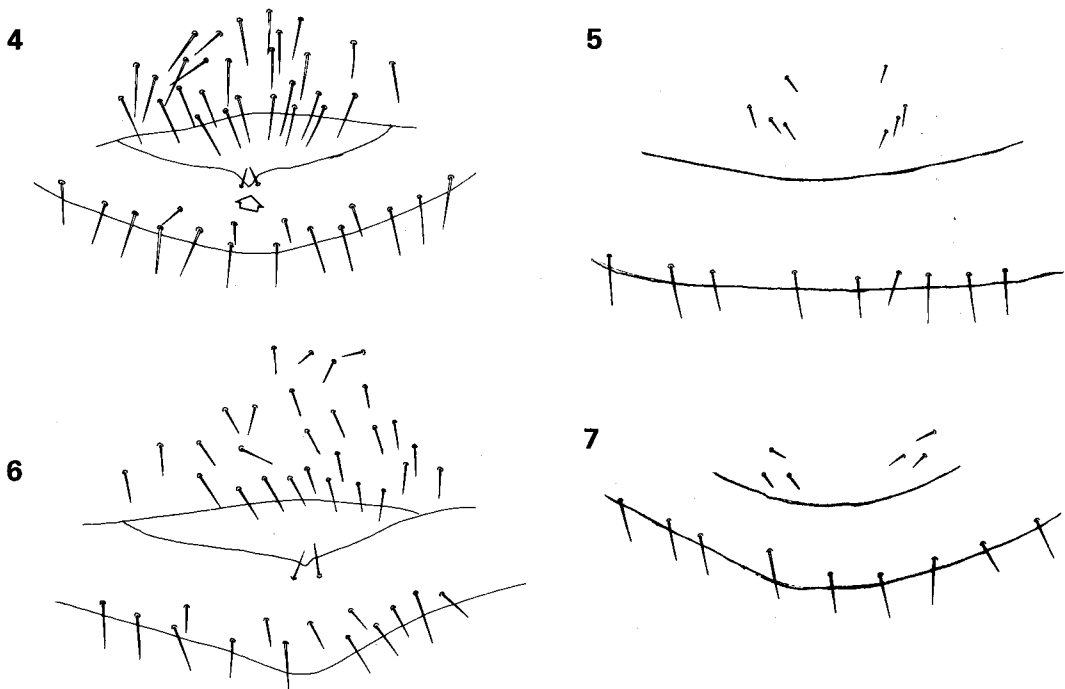
Distribution: Vietnam.

Bisetocreagris parablothroides (Beier, 1951) (Figs. 10, 18)

Microcreagris parablothroides Beier, 1951

Material examined: Holotype male, from Cha Pa, Ht Tonkin, Vietnam, 1500 m, July 1939, mission of C. Dawydoff to Indochina in 1938/39, C. Dawydoff leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Carapace distinctly longer than broad; four weakly-developed eye-spots; epistomal process tubercle-like. Carapacial chaetotaxy: 4-7, 29. Beier (1951) erroneously describes 30 instead of 29 setae



Figs. 4-7: Genital area. 4 *Bisetocreagris philippinensis*, male; 5 *B. annamensis*, female; 6 *Chinacreagris chinensis*, male; 7 *C. nankingensis*, female.

on the cephalothorax.

Tergites uniseriate; tergal formula: 10-10-11-11-12-12-11-12-10-10. Male genital area: sternite II with a median and posterior group of 29 setae; apart from an anterior bisetous groove, sternite III has 5 irregularly distributed intermediary setae, behind which there is a series of 12 posterior setae. Sternites IV-X uniseriate; pleural membranes granulostrate.

Cheliceral galea with 3 terminal branchlets; fixed cheliceral finger with 7, movable finger with one seta. Flagellum eight-bladed, with a form characteristic of the genus (Fig. 10).

Apex of pedipalpal coxa with 4 long setae. Pedipalpal trochanter with a pronounced tubercle; femur, tibia and chelal palm granulate. Fixed chelal finger with 51 contiguous teeth, movable chelal finger with 40 teeth (the tip of the movable finger is damaged). Chelal palm approximately equal in length to fingers.

Distribution of trichobothria (Fig. 18) and number and distribution of pedal tactile setae are characteristic of the genus *Bisetocreagris*.

Distribution: Vietnam.

Bisetocreagris silvicola (Beier, 1979) (Figs. 9, 19)

Microcreagris silvicola Beier, 1979

Material examined: Two paratype males and two paratype females, collected in the Maritime Province (Primorsky krai), Chuguevka Region, Verkhne Ussurijsky Station, USSR, *Picea* litter, August 1974, G. F. Kurčeva leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Epistome small, tubercle-like and rounded; carapace somewhat longer than broad. Anterior eyes with flattened lenses, posterior eyes spot-like. Setal formula of carapace: 4-(6-9), 22-25 (female), or 4-6, 22 (male).

Although Beier (1979) mentions that abdominal tergites carry 8-10 setae each, tergite I in the male has 6, and tergite II has 11 setae! Tergites III-X carry 10-14 setae each. Tergites uniseriate. Male genital area: sternite II with a posterior and median group of 38-40 setae. Sternite III bears an anteromedian bisetous groove, 7 or 8 intermediary setae, and 10 or 11 posterior setae. Female genital area: sternite II with a group of 3 or 4 small setae on either side of the middle; sternite III with 12 or 13 posterior setae. Pleural membranes granulostrate.

Galea elongated and branched, each branch bifurcate. Cheliceral palm with 7, movable finger with one seta. Flagellum seven- or eight-bladed; flagellar structure characteristic of the genus (Fig. 9).

Manducatory process with 4 long setae, and not 3, as Beier states (1979). Pedipalpal trochanter with a pronounced tubercle. Femur with 7-9 distal granulations, tibia and chelal palm also granulate. Fixed chelal finger in male has 63 teeth (58-61 in female), movable finger bears 64 teeth in male (62 or 63 in female).

Trichobothrial pattern (Fig. 19) and disposition of pedal tactile setae on leg IV are similar to those of the species of this genus already mentioned.

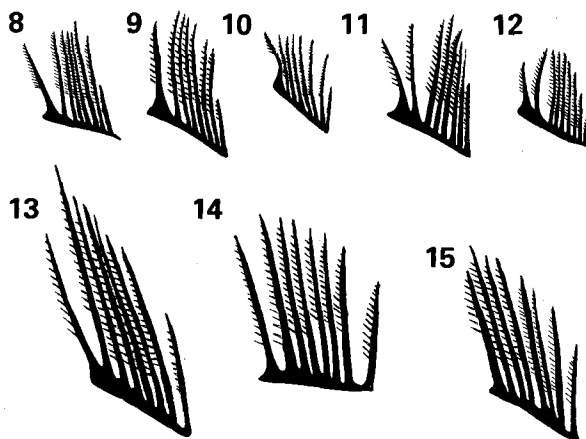
Distribution: USSR.

Bisetocreagris furax (Beier, 1959)

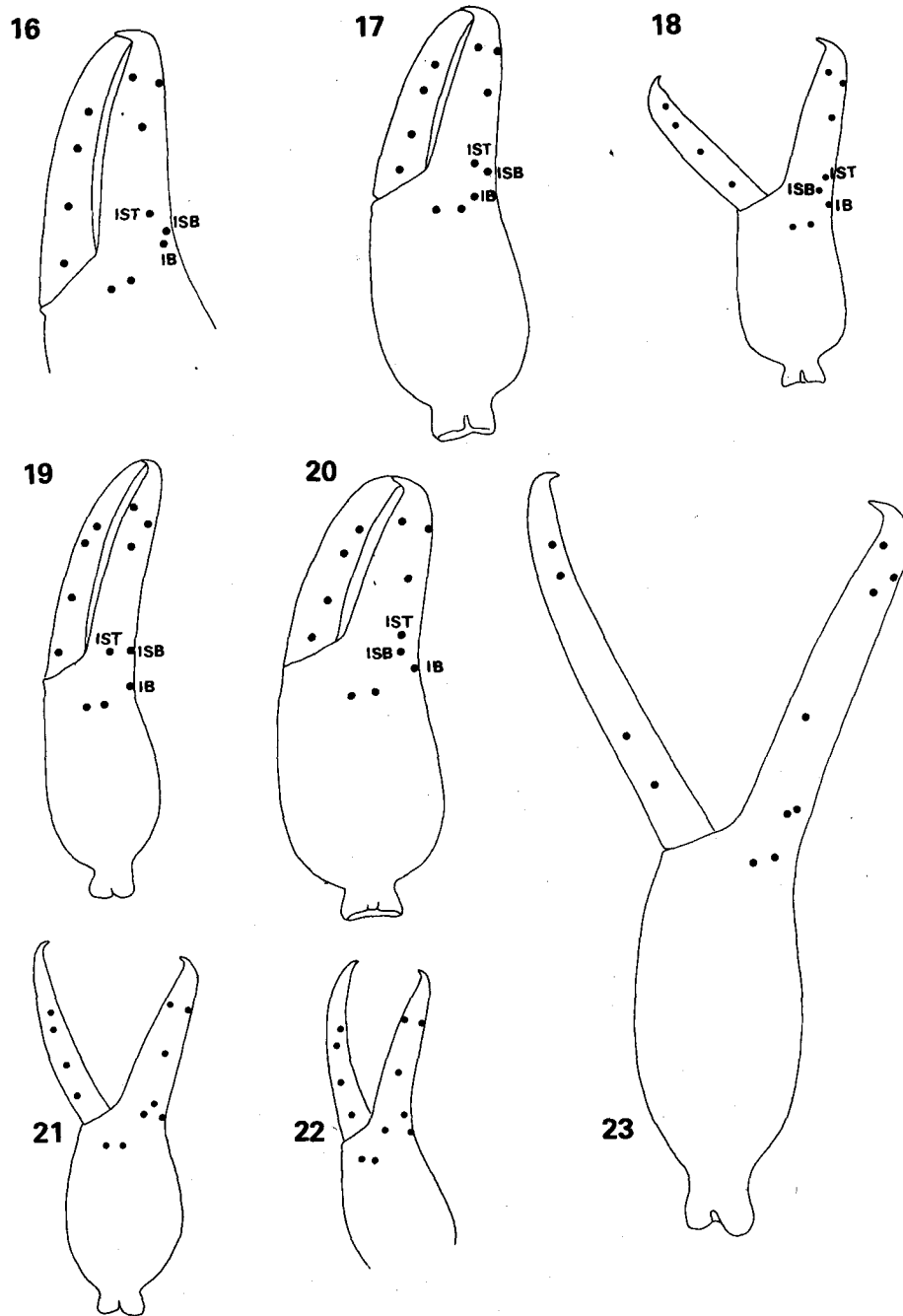
Microcreagris furax Beier, 1959

Material examined: Holotype male, from Kandahar, South Afghanistan, 950 m, 11 February 1953, J. Klapperich leg., in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Epistome tubercle-like; four-eyed, posterior lenses more flattened than anterior. Setal carapacial formula: 4-6, 25.



Figs. 8-15: Flagellum. 8 *Bisetocreagris annamensis*, female; 9 *B. silvicola*, male; 10 *B. parablothroides*, male; 11 *Chinacreagris chinensis*, male; 12 *C. nankingensis*, female; 13 *Levigatocreagris gruberi*, female; 14 *L. lindbergi*, tritonymph; 15 *L. gruberi*, male.



Figs. 16-23: Chela and trichobothrial pattern. 16 *Microcreagris herculea*, female; 17 *Bisetocreagris annamensis*, female; 18 *B. parablothroides*, male; 19 *B. silvicola*, male; 20 *Chinacreagris chinensis*, male; 21 *C. nankingensis*, female; 22 *C. kwantungensis*, female; 23 *Levigatocreagris gruberi*, male.

Median abdominal tergites with 12 setae each. Male genital area: sternite II with a median and posterior group of 14 scattered setae. Sternite III with an anteromedian bisetous groove in the form of a V, followed by 3 intermediary and 11 posterior setae. Pleural membranes granulostrate.

Galea terminally divided into three branchlets. Cheliceral palm with 6 setae, movable finger with one seta. Flagellum eight-bladed, with a form characteristic of the genus.

Apex of pedipalpal coxa with 4 long and acuminate setae, and not 3, as Beier states (1959). Pedipalpal trochanter with a minute tubercle; weak granulations on femur and chelal palm (externally). Fixed chelal finger with 51 teeth, movable finger with 46 contiguous teeth. Chelal palm shorter than fingers.

Trichobothriotaxy and number and disposition of pedal tactile setae are similar to those of the species of this genus already mentioned.

Distribution: Afghanistan.

Bisetocreagris klapperichi (Beier, 1959)

Microcreagris klapperichi Beier, 1959

Material examined: Holotype female, from Kandahar-Kuna, 950 m, South Afghanistan, 22 January 1953, J. Klapperich leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Epistome rounded, tubercle-like; four eyes with flattened lenses; setal carapacial formula: 4-6, 22.

Tergal formula: 6-10-10-9-11-9-10-9-9-10; Beier (1959), however, states imprecisely: "Abdominal-tergite grösstenteils mit 11 Marginalborsten". Female genital area: sternite II with a group of 3 setae on either side of the middle; sternite III with a row of 8 posterior setae; sternites IV-X carry 9-12 setae each. Pleural membranes granulostrate.

Galea present, but damaged on both chelicerae. Fixed cheliceral finger with 6, and movable finger with one seta. Flagellum seven-bladed, similar to that of the above-mentioned species of the genus.

Manducatory process with 4 long and acuminate setae, and not 3 as stated by Beier (1959). Pedipalpal trochanter with a flattened tubercle; femur and chelal palm granulate, the latter less strongly. Fixed chelal finger with 57 contiguous teeth, movable finger with 54 teeth. Chelal palm somewhat shorter than fingers.

Trichobothriotaxy and disposition of pedal tactile setae are characteristic of the genus.

Distribution: Afghanistan.

Bisetocreagris philippinensis (Beier, 1931) (Fig. 4)

Microcreagris philippinensis Beier, 1931

Material examined: One male, Mindanao, 900 m, Mt. McKinley, Philippines, 22 August 1946, Hogstruel leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Anterior carapacial margin with a minute epistomal tubercle; four eyes with almost flattened lenses; setal carapacial formula: 4-6, 22.

Although Beier (1931) claims that "Tergite und Sternite mit je 8-10 Borsten", tergites I and II have 6 setae each, tergites III and IV have 8 each, tergites V-VIII have 9 each, tergite IX has 10, and tergite X bears 8 setae. Male genital area (Fig. 4): sternite II bears a median and posterior group of 28 scattered setae; sternite III with an anteromedian bisetous groove, 4 intermediary setae, and 12 posterior setae. Sternites V-X carry 10-12 setae each. Pleural membranes granulostrate.

Galea small, with three terminal branchlets. Fixed cheliceral finger with 6 setae, movable finger with one seta. Flagellum eight-bladed; the smallest, proximal blade is less than one-third of the length of the longest blades.

Apex of pedipalpal coxa with 4 long setae; pedipalpal trochanter with a small tubercle; femur, tibia and chelal palm granulate. Fixed chelal finger with 45 teeth, movable finger with 54 teeth. Disposition of trichobothria characteristic of the genus *Bisetocreagris*.

Number and disposition of tactile setae on leg IV are similar to those in other species of the genus.

Distribution: Philippines.

Bisetocreagris maritima new species (Figs. 24-29)

Microcreagris macropalpus Morikawa, 1955; M. Beier misident.

Etymology: After its terra typica.

Material examined: One male and one tritonymph, collected in "Küstenprovinz d. USSR, Fedorow leg., ex Mus. Moskau, M. Beier det." (as *Microcreagris macropalpus* Morikawa, 1955); in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Carapace longer than broad; epistome rounded and tubercle-like; anterior eyes with flattened lenses, posterior eyes spot-like; carapacial chaetotaxy of male: 4-6, 28.

Tergal formula of male: 6-9-9-10-11-11-11-11-11-10. Male genital area (Fig. 29): sternite II with a posterior and median group of 32 setae. Sternite III bears an anteromedian bisetous groove, 6 intermediary setae and 12 posterior setae. Sternites IV-X of the male carry 9-17 setae each. Pleural membranes granulostriate.

Cheliceral galea bifurcate (Fig. 25); each branch with two terminal branchlets. Fixed cheliceral finger with 7 setae, movable finger with one seta. Flagellum eight-bladed (Fig. 28); proximal blade less than half the length of longest flagellar blades.

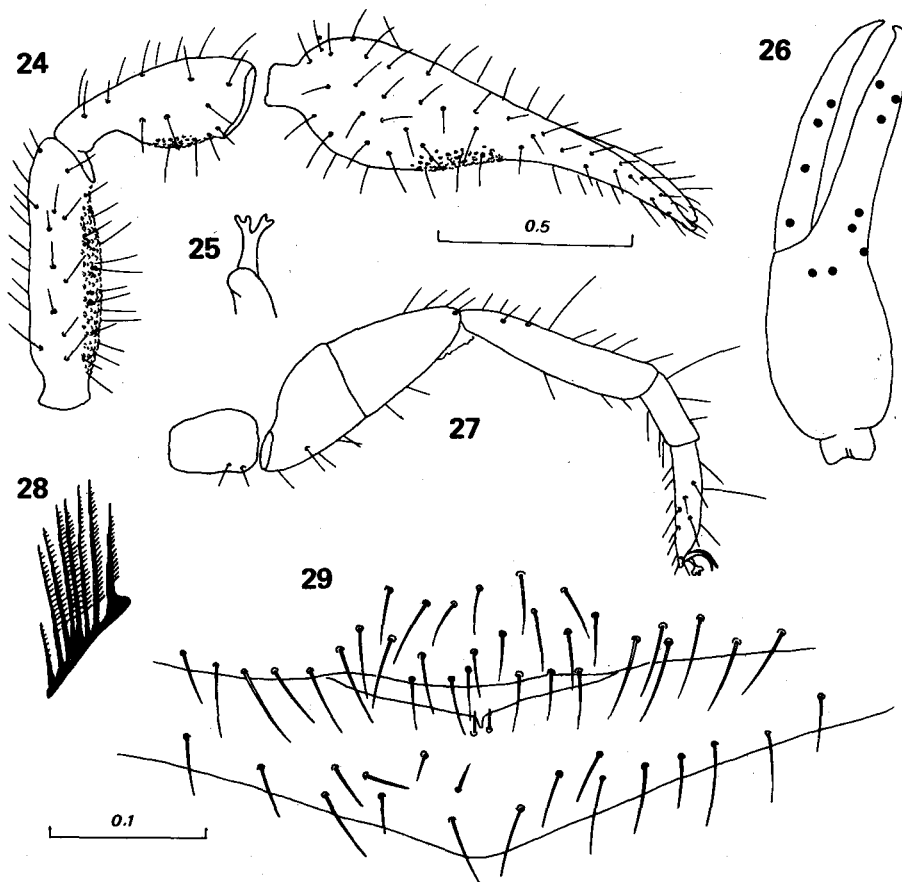
Manducatory process with 4 long and acuminate setae. Pedipalpal trochanter smooth; femur, tibia and chelal palm granulate (Fig. 24). Fixed chelal finger with 49 teeth, movable finger with 54 contiguous teeth. Chelal palm somewhat shorter than fingers.

Trichobothriotaxy and number of tactile setae on leg IV (Fig. 27) are similar to those in other species of the genus. Morphometric data are presented in Table 1.

Distribution: USSR.

Genus *Chinacreagris* new genus

Etymology: After China, the terra typica of its representatives.



Figs. 24-29: *Bisetocreagris maritima* n. gen., n. sp., male. 24 pedipalp; 25 galea; 26 chela; 27 leg IV; 28 flagellum; 29 genital area. Scale lines in mm.

Type species: Microcreagris chinensis Beier, 1943.

Diagnosis: Carapace longer than broad; epistome tubercular or triangular; with four eyes; carapacial formula: 4-(6-8), 21-26.

Cheliceral palm with 6 or 7 setae, movable finger with one seta. Flagellum seven- to nine-bladed, all blades pinnate along their anterior margins; the two distal blades dilated at their bases and somewhat further from the other blades; subproximal blades diminish in size towards proximal end of flagellum. Galea branched.

Abdominal tergites and sternites entire and smooth; sternites biseriate; pleural membranes granulostrate. Male genital area (Fig. 6): sternite II carries a cluster of median and posterior setae; sternite III with a bisetous groove in the form of a V in the middle of its anterior border; the same sternite carries some intermediary setae and a row of transversely arranged posterior setae. Female genital area (Fig. 7): sternite II with a group of setae on either side of the middle; sternite III with a posterior series of marginal setae.

Sternites VI-VIII carry 2-4 median setae each; the discal setae located anterior to the posterior setal row, at a distance of about 1-3 diameters from this row.

Apex of pedipalpal coxa with 5 (occasionally 6) long and acuminate setae; pedipalpal articles smooth (non-granulate). Trichobothria (Figs. 20-22): *eb* and *esb* on bulb of chela, separated from each other by approximately one diameter, *esb* not distal to *eb*. Setae *ib*, *isb* and *ist* on base of finger, *est* nearly equidistant from *it* and *ist*; *st* closer to *t* than to *sb* (Figs. 20-22).

Tibia IV, basitarsus IV and telotarsus IV carry one long tactile seta each.

Chinacreagris chinensis (Beier, 1943) (Figs. 6, 11, 20)

Microcreagris chinensis Beier, 1943

Material examined: Topotype male, collected in Nanking, China, 4 December 1923 (cited in Beier, 1967: 342); in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Carapace longer than broad; four eyes with somewhat flattened lenses; three microsetae in front of each anterior eye; epistomal process tubercle-like. Although Beier (1943) quotes the cephalothor-

acal chaetotaxy: 6-8, 30 for the female holotype, in this specimen the number of carapacial setae is: 4-8, 26.

Beier states (1943) that tergites and sternites carry 14 marginal setae in the female holotype; the tergal formula of the male is: 11-12-13-16-18-16-16-14-15. Male genital area (Fig. 6): sternite II with a posterior and median group of 28 setae; sternite III with an anteromedian bisetous groove, 4 intermediary setae and a posterior row of 10 setae. Sternites V-X with 17-19 setae each. Sternites VI-VIII biseriate, bearing 2 anterior discal setae each. Pleural membranes granulostrate.

Galea elongated and branched, each branch bifurcate, with a total of 8 terminal branchlets. Fixed cheliceral finger with 7, movable finger with one seta. Flagellum seven- or eight-bladed, of a shape characteristic of the genus.

Manducatory process with 5 or 6 setae (5 in female according to Beier). Pedipalpal articles robust and smooth, non-granulate. Chelal palm somewhat longer than fingers.

Trichobothriotaxy (Fig. 20) and disposition of tactile setae on leg IV as presented in diagnosis of genus.

Distribution: China.

Chinacreagris kwantungensis (Beier, 1967) (Fig. 22)

Microcreagris kwantungensis Beier, 1967

Material examined: Paratype female, from Tsin Leong San, E. Kwantung, South China, 6 June 1936, J. L. Gressitt leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Carapace somewhat longer than broad; epistome small, triangular and rounded on top; four eyes with flattened lenses, posterior eyes spot-like. Setal formula of carapace: 4-6, 21.

Tergal formula: 6-9-11-10-11-13-12-12-11-11. Male genital area: sternite II bears a group of 3 or 4 setae on either side of the middle; sternite III with 12 posterior and marginal setae; sternite IV with 10, sternites V-X with 14-16 setae each. Sternites VI-VIII with 2-4 median setae each, located anterior to the other setae, at a distance of 1-3 diameters.

Cheliceral galea trifurcate, deeply incised; terminal branchlets total 8. Cheliceral palm with 6 setae, whereas Beier (1967) states that palm carries 6 or 7

setae (6 specimens); movable finger with one seta. Flagellum eight-bladed, of a shape characteristic of the genus.

Apex of pedipalpal coxa with 5 long, acuminate setae. Pedipalpal trochanter with a minute tubercle; all pedipalpal articles smooth, non-granulate. Fixed chelal finger with 55 contiguous teeth, movable finger with 60 teeth. Disposition of trichobothria (Fig. 22) and number of pedal tactile setae similar to those in *C. chinensis*.

Distribution: China.

Chinacreagris nankingensis new species (Figs. 7, 12, 21, 30-31)

Material examined: Holotype female, from Nanking, China, 4 December 1923; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Carapace as long as broad; two pairs of eyes with flattened lenses; epistomal process tubercle-like; carapacial formula: 4-6, 22.

Tergal formula: 6-9-11-11-12-11-11-12-12-11. Female genital area (Fig. 7): sternite II with a group

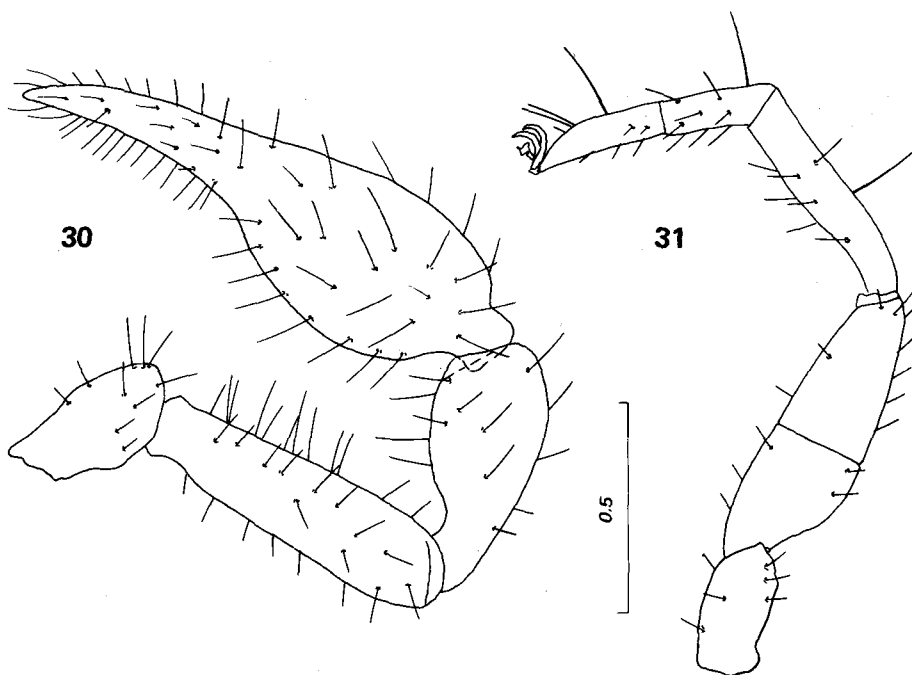
of three small setae on either side of the middle; sternite III with a row of 9 posterior setae and 4 microsetae along each of the stigma; sternites V-X with 14-17 setae each. Sternites VI-VIII each carry 2 discal setae, located anterior to posterior setal row, at a distance of 1-3 diameters.

Cheliceral galea large and trifurcate; median branch has 3 terminal branchlets, and lateral branches only 2 each – a total of 7. Fixed cheliceral finger with 6, and movable with one seta. Flagellum eight- or nine-bladed (Fig. 12).

Manducatory process with 4 or 5 long and acuminate setae (one specimen!). Pedipalpal trochanter with a minute tubercle; all pedipalpal articles smooth (Fig. 30). Chelal palm somewhat longer than fingers. Fixed chelal finger with 52 small teeth, movable finger with 56 small and contiguous teeth.

Trichobothrial pattern (Fig. 21) and number of pedal tactile setae on the fourth pair of walking legs (Fig. 31) are similar to those in the other two species of the genus. Measurements and morphometric data as in Table 1.

Distribution: China.



Figs. 30-31: *Chinacreagris nankingensis* n. genf., n. sp., female. 30 pedipalp; 31 leg IV. Scale line in mm.

	<i>B. maritima</i>		<i>C. nankingensis</i>	<i>L. gruberi</i>	
	♂	tritonymph	♀	♀	♂
Body					
Length (1)	2.44	2.61	2.00*	6.24	4.80
Cephalothorax					
Length (2)	0.66	0.62	0.73	1.51	1.37
Breadth	0.58	0.65	0.79	1.41	1.15
Abdomen					
Length	1.78	1.99	1.27*	4.73	3.43
Breadth	0.89	1.06	1.10	2.13	2.02
Chelicerae					
Length (3)	0.425	0.40	0.49	1.03	0.89
Breadth	0.22	0.23	0.26	0.51	0.42
Length of movable finger (4)	0.29	0.28	0.31	0.73	0.60
Ratio 3/4	1.465	1.43	1.58	1.41	1.48
Length of galea	0.05	0.07	0.09	0.19	0.18
Pedipalps					
Length with coxa (5)	3.39	3.345	3.88	9.885	8.885
Ratio 5/1	1.39	1.28	1.94*	1.58	1.85
Length of coxa	0.48	0.535	0.59	1.30	1.17
Length of trochanter	0.36	0.38	0.43	1.03	0.93
Length of femur (6)	0.75	0.66	0.82	2.13	1.955
Breadth of femur (7)	0.185	0.19	0.21	0.47	0.41
Ratio 6/7	4.05	3.47	3.90	4.53	4.77
Ratio 6/2	1.14	1.06	1.12	1.41	1.43
Length of tibia (8)	0.58	0.58	0.64	1.715	1.52
Breadth of tibia (9)	0.22	0.23	0.27	0.52	0.46
Ratio 8/9	2.64	2.52	2.37	3.30	3.30
Length of chela (10)	1.22	1.19	1.40	3.71	3.31
Breadth of chela (11)	0.31	0.34	0.425	0.97	0.75
Ratio 10/11	3.935	3.50	3.29	3.82	4.41
Length of chelal palm (12)	0.55	0.56	0.73	1.82	1.58
Ratio 12/11	1.77	1.65	1.72	1.88	2.11
Length of finger (13)	0.67	0.63	0.67	1.89	1.73
Ratio 13/12	1.22	1.125	0.92	1.04	1.09
Leg IV					
Total length	2.395	2.39	2.795	7.115	6.33
Length of coxa	0.36	0.40	0.44	0.93	0.82
Breadth of coxa	0.24	0.23	—	0.51	0.445
Length of trochanter (14)	0.27	0.29	0.34	0.795	0.75
Breadth of trochanter (15)	0.16	0.14	0.16	0.31	0.27
Ratio 14/15	1.69	2.07	2.125	2.56	2.78
Length of femur (16)	0.66	0.63	0.795	1.88	1.65
Breadth of femur (17)	0.24	0.205	0.24	0.43	0.41
Ratio 16/17	2.75	3.07	3.31	4.37	4.02
Length of tibia (18)	0.535	0.53	0.58	1.71	1.52
Breadth of tibia (19)	0.12	0.11	0.11	0.24	0.21
Ratio 18/19	4.46	4.82	5.27	7.125	7.24
Length of basitarsus (20)	0.23	0.21	0.29	0.67	0.61
Breadth of basitarsus (21)	0.08	0.085	0.09	0.16	0.15
Ratio 20/21	2.875	2.47	3.22	4.19	4.07
Length of telotarsus (22)	0.34	0.33	0.35	1.13	0.98
Breadth of basitarsus (23)	0.075	0.085	0.08	0.14	0.14
Ratio 22/23	4.53	3.88	4.375	8.07	7.00
Tactile setae ratio tibia IV	0.45	0.43	0.46	0.19	0.23
				0.67	0.61
				0.865	0.83
Tactile setae ratio basitarsus IV	0.18	0.16	0.21	0.12	0.13
				0.46	0.48
				0.785	0.81
Tactile setae ratio telotarsus IV	0.38	0.31	0.39	0.10	0.10
				0.26	0.27
				0.42	0.45
				0.55	0.63

Table 1: Range in measurements (mm) of various structures, together with selected ratios, in *Bisetocreagris maritima* n. gen., n. sp., *Chinacreagris nankingensis* n. gen., n. sp., and *Levigatocreagris gruberi* n. gen., n. sp. (* = abdomen contracted; specimen preserved in alcohol).

Remarks: The holotype of this species was found with the topotype of *C. chinensis* in the same vial. Comparative analysis of the morphology of these two specimens has shown that we are dealing with two separate species; the new species is easily distinguished from *C. chinensis* by the carapacial and abdominal chaetotaxy, the form of pedipalpal articles (Fig. 30) and the morphometric ratios (Table 1).

Genus *Levigatocreagris* new genus

Etymology: *levigatus*, adj., Latin = smooth; referring to dermal structure of pedipalpal articles.

Type species: *Levigatocreagris gruberi* new species.

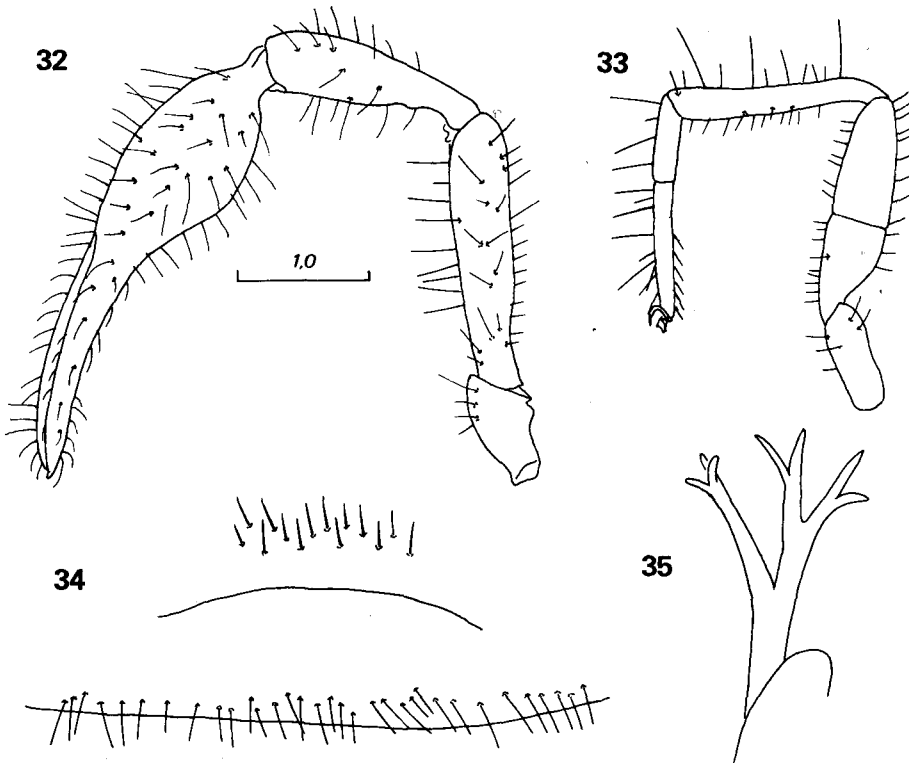
Diagnosis: Carapace smooth, longer than broad; epistome small, with rounded top; four eyes; carapacial formula: (5-6)-(6-7), 26-28.

Abdominal tergites and sternites smooth and entire. Tergites uniseriate, sternites biseriate; pleural

membranes granulostriate. Male genital area (Fig. 3): sternite II with a posterior and median group of setae; sternite III with an anterior and median group of setae, with a row of irregularly distributed setae, and a posterior series of marginal setae. In addition to the posterior setae, sternites VI-VIII each carry 3-5 anterior and median discal setae.

Cheliceral palm with 6 or 7 setae, movable finger with one seta. Galea elongated and branched, each branch bifurcate. Flagellum seven- or eight-bladed (occasionally six-bladed), the most distal blade somewhat dilated at its base; other blades diminish in size towards proximal end of flagellum. All flagellar blades pinnate anteriorly (Figs. 13-15).

Manducatory process with 5 long setae; all pedipalpal articles smooth, with no granulations. Femur with three or four small spaced-out interior tubercles. Trichobothria (Fig. 23): *eb* and *esb* on bulb of chela, separated from each other by 1-1.5 diameters, *esb* slightly distal to *eb*. Setae *ib* and *isb* on base of finger,



Figs. 32-35: *Levigatocreagris gruberi* n. gen., n. sp. 32 pedipalp, female; 33 leg IV, male; 34 genital area, female; 35 galea, male. Scale line in mm.

est, *it* and *et* on distal part of finger; *ist* further from *it* and *et*, and closer to *isb* than to *est*. Seta *st* close to *t*, and *sb* close to *b*.

Leg IV: tibia with two (or three), basitarsus with two (or three), and telotarsus with three (or four) tactile setae.

Levigatocreagris gruberi new species (Figs. 3, 13, 15, 23, 32-35)

Etymology: This species is named after Dr Jürgen Gruber.

Material examined: Holotype male and paratype female, from W. Nepal, Dzunda, Khola Valley, 18 September 1972, H. Franz leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Epistome small, triangular, with rounded top; with four eyes, of which the posterior have flattened lenses. Setal formula of carapace: 6-(4-6), 26-30.

Tergal formula of male: 5-8-10-10-12-11-11-12-10-9, and of female: 6-9-10-10-11-12-11-11-10-9. Male genital area (Fig. 3): sternite II with a posterior and median group of 23 setae; sternite III with an anteromedian group of 8 setae, 8 intermediary setae, and a posterior transverse series of 20 setae. Female genital area (Fig. 34): sternite II with a median group of 14 scattered setae; sternite III with a posterior row of 33 setae. Sternite IV with 17 (male) or 15 (female) posterior setae; sternite V with 16 setae (female) or 20 setae (male); sternite VI with 16 (female) or 24 setae (male), sternite VII with 15 (female) or 22 setae (male), sternite VIII with 16 (female) or 23 setae (male); sternite IX has 15 (female) and 18 setae (male), and sternite X has 14 setae in both sexes. Sternites VI-VIII biseriata; thus, sternite VI has 6 (female) and 8 (male) anterior discal setae, sternite VII has 5 (female) and 7 (male), and sternite VIII has 5 (female) and 4 (male) of these setae.

Galea elongate and bifurcate. In the male, one branch has 3 terminal branchlets, while the other branch is secondarily bifurcate, with each of these secondary branches bearing another 2 terminal branchlets (Fig. 35). In the female, at the base of the secondary branch, there is a small accessory galeal process. Cheliceral palm with 6 setae, movable finger with one seta. Flagellum six- (male), eight- or nine-bladed (female). The most proximal flagellar blade is the smallest (Fig. 13).

Manducatory process with 5 long and acuminate setae. Trochanter with no tubercle; all pedipalpal articles smooth (Fig. 32). Chelal palm shorter than fingers.

Morphometric data as in Table 1.

Trichobothriotaxy and chaetotaxy of leg IV (Fig. 33) as described in diagnosis of genus.

Distribution: Nepal.

Levigatocreagris lindbergi (Beier, 1959) (Fig. 14)

Microcreagris lindbergi Beier, 1959

Material examined: Holotype tritonymph, from Djelala in Konar Valley, "am Grunde der Höhle", 2 February 1958, K. Lindberg leg.; in the collections of the Naturhistorisches Museum, Vienna.

Diagnosis: Epistomal process rounded and tubercle-like; with four eyes; setal formula of carapace: 6-6, 28.

Tergal formula: 6-8-10-11-11-12-11-12-11-11. Sternite II with a group of three setae on each side of the middle. Sternite III with 28 posterior setae; sternites IV-X biseriata, each with a pair of anterior and median discal setae in front of the posterior setal row. These discal setae are arranged the furthest forward on sternites V-VII. Chaetotaxy of sternites IV-X: 18-20-20-18-17-15-14.

Galea elongate and bifurcate, each branch with 2 terminal branchlets. Cheliceral palm with 6 setae, movable finger with one seta. Flagellum eight-bladed (Fig. 14), similar to that of *L. gruberi* n. sp.

Manducatory process with 4 long setae (tritonymph!); trochanter with small tubercle; all pedipalpal articles smooth. Trichobothrium *ist* close to middle of finger, and nearer to distal than to proximal group of trichobothria. Fixed chelal finger with 90 teeth, movable finger with 78 contiguous teeth. Teeth of distal half of fixed finger heterodentate – every two long and pointed teeth are succeeded by 2 or 3 short and rounded teeth.

Leg IV with tactile setae on tibia (2), basitarsus (2), and telotarsus (2 or 3).

Distribution: Afghanistan.

Key to genera

The genus *Microcreagris* and the newly-established genera may be distinguished by means of the

following key:

1. All flagellar blades of approximately same size. Sternite II of male with a posterior and median group of setae; sternite III with anterior transverse row of setae and central group of elevated and dense setae in middle of posterior setal row (Fig. 1) *Microcreagris* Balzan
 - Subproximal flagellar blades diminish in size (Figs. 8-15). Sternite II of male with a posterior and median group of setae; sternite III with a group of anteromedian setae, followed by some intermediary setae, and a posterior series of marginal setae (Fig. 3) 2
2. Sternites uniseriate; apex of pedipalpal coxa with 4 long setae *Bisetocreagris* Čurčić
 - Sternites VI-VIII biseriate; apex of pedipalpal coxa with 5 long setae 3
3. The two distal flagellar blades dilated at their bases and somewhat further from other blades (Fig. 11). Tibia IV, basitarsus IV and telotarsus IV with one tactile seta each . . . *Chinacreagris* Čurčić
 - Only the most distal flagellar blade somewhat dilated at its base (Fig. 14). Tibia IV, basitarsus IV and telotarsus IV with two to four tactile setae each *Levigatocreagris* Čurčić

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