

***Anokha* gen. n. (Hymenoptera: Platygastroidea: Scelionidae) and two new species from India**

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Abstract

A new genus *Anokha* is described in the subfamily Scelioninae (Hymenoptera: Scelionidae), from India with two new species *A. anoojii* Rajmohana and Veenakumari and *A. nigra* Rajmohana. The new genus is distinguished from other Scelioninae, by the following combination of characters: closely placed large, round, setigerous tubercles separated by narrow sinuous furrows on head and mesosoma; posteriorly emarginate mesoscutellum with postero-lateral corners drawn into prominent spines. Both sexes are described and imaged. Affinities with closely resembling genera are discussed.

Keywords: *Anokha*, new genus, new species, *Platygastroidea*.

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Introduction

The superfamily Platygastroidea with four families (McKellar and Engel, 2012), 166 genera and around 2600 species, is one of the most diverse taxa in Hymenoptera (Johnson, 2016). Although, new taxa at the generic and species levels have recently been described in this family from India (Rajmohana and Peter, 2012; Rajmohana, 2014; Rajmohana and Veenakumari, 2014). Yet another genus *Anokha* is erected as new with two new species *A. anoojii* Rajmohana and Veenakumari and *A. nigra* Rajmohana. Closely placed large, round, setigerous tubercles separated by narrow sinuous furrows on head and mesosoma, resemble the sculpture in the genus *Chakra* Rajmohana and Veenakumari, 2014. With a posteriorly emarginate mesoscutellum having its postero-lateral corners drawn into pointed spines, the proposed new genus is quite unique and distinct

in Scelioninae.

Materials and Methods

Specimens collected using yellow pan traps, malaise traps and sweep nets were mounted on point-card tips and described, measured and imaged using a Leica M205A stereomicroscope, with 1× objective and Leica DFC-500 digital camera. The holotype and paratypes of *A. anoojii* and *A. nigra* with ZSI registration numbers are deposited at the National Zoological Collection, Zoological Survey of India, Calicut (ZSI), while seven paratypes of *A. anoojii* with NBAIR registration numbers are at the National Bureau of Agricultural Insect Resources, Bengaluru (NBAIR). Morphological terminology follows Masner (1976, 1980), Austin and Field (1997) and Mikó *et al.* (2007, 2010).

All measurements are taken as per Miko *et al.* (2010). Abbreviations used in the description of taxa are as follows: HL-Head length; HW-Head width; HH-Head height; FCI (Frontal cephalic index)=HW/HH; LCI (Lateral cephalic index)=HH/HL; A1-A12-Antennomeres 1-12 (A1=Scape, A2=Pedicel); L-Length; W-Width; H-Height; OOL-Ocellar-ocular length; POL- Posterior ocellar length; LOL-Lateral ocellar length; IOS-Interorbital space; T1-T7-Metasomal tergites 1 to 7. The width of all metasomal tergites was taken anteriorly.

Results

Anokha Rajmohana & Veenakumari, gen. n.
(Figs 1-18)

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Type species: *Anokha anoojii* Rajmohana & Veenakumari

Derivation of genus name. ‘*Anokha*’ in Sanskrit means unique, referring to the uniqueness of the taxon. The gender is feminine.

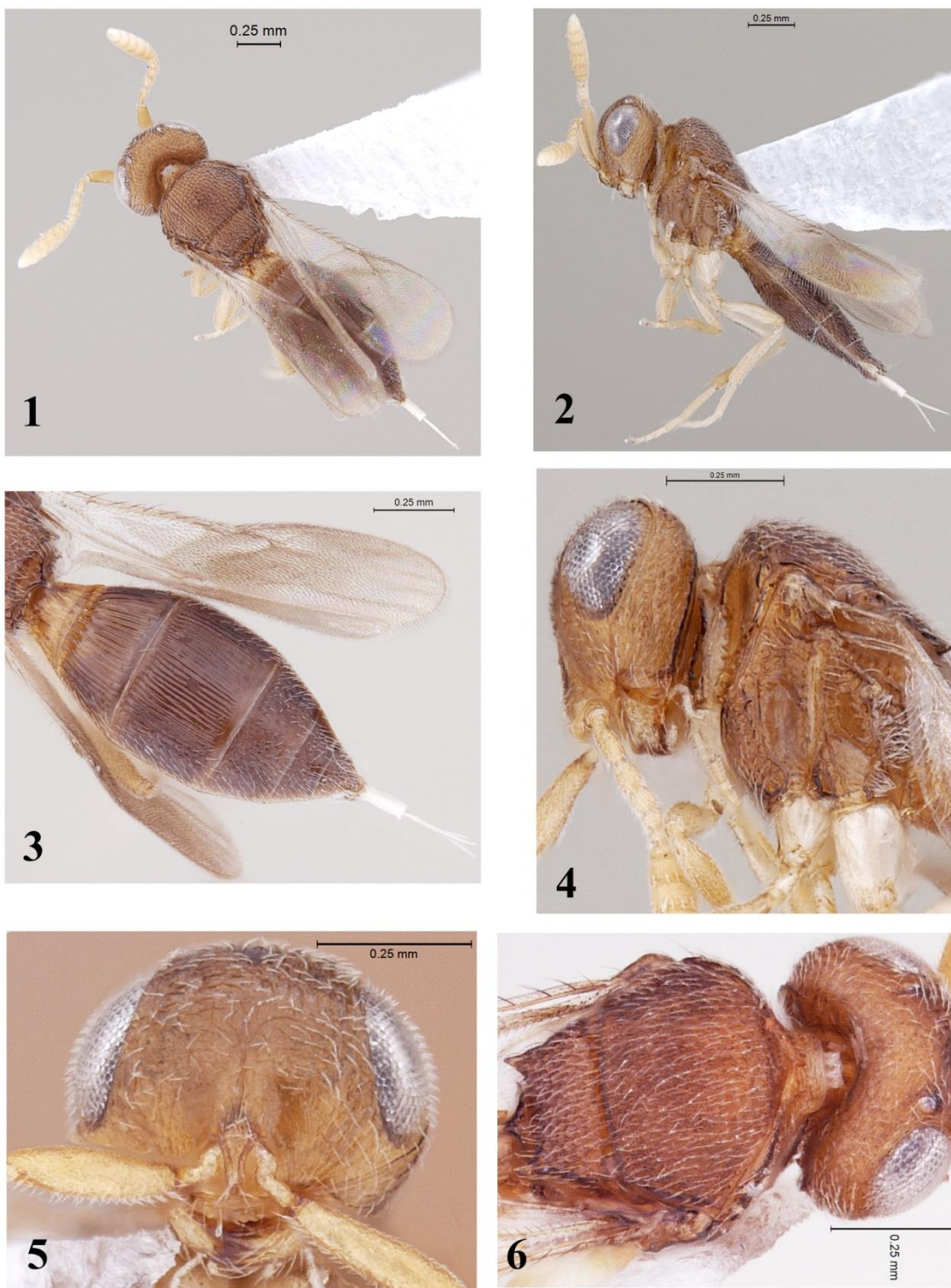
Diagnosis

Specimens of this genus key out to *Dichoteleas* Kieffer 1907 and *Neoscelio* Dodd 1913 at couplets 51 of Masner (1976) and 40 of Galloway and Austin (1984). However, this genus has characters found in both these genera. This new genus differs from *Dichoteleas* in having densely setose eyes; in *Dichoteleas* A3 is distinctly longer than A2 and clava with seven clavomeres whereas in *Anokha* A3 shorter than A2 in females and clava with six clavomeres. This genus also differs from *Neoscelio* in having a distinct postmarginalis. This genus is also similar to *Chakra* in having large round setigerous tubercles on head and mesosoma. It differs from *Chakra* in having lateral ocelli closer to orbital margins than to median ocellus (OOL<POL) and presence of spines on mesoscutellum postero-laterally.

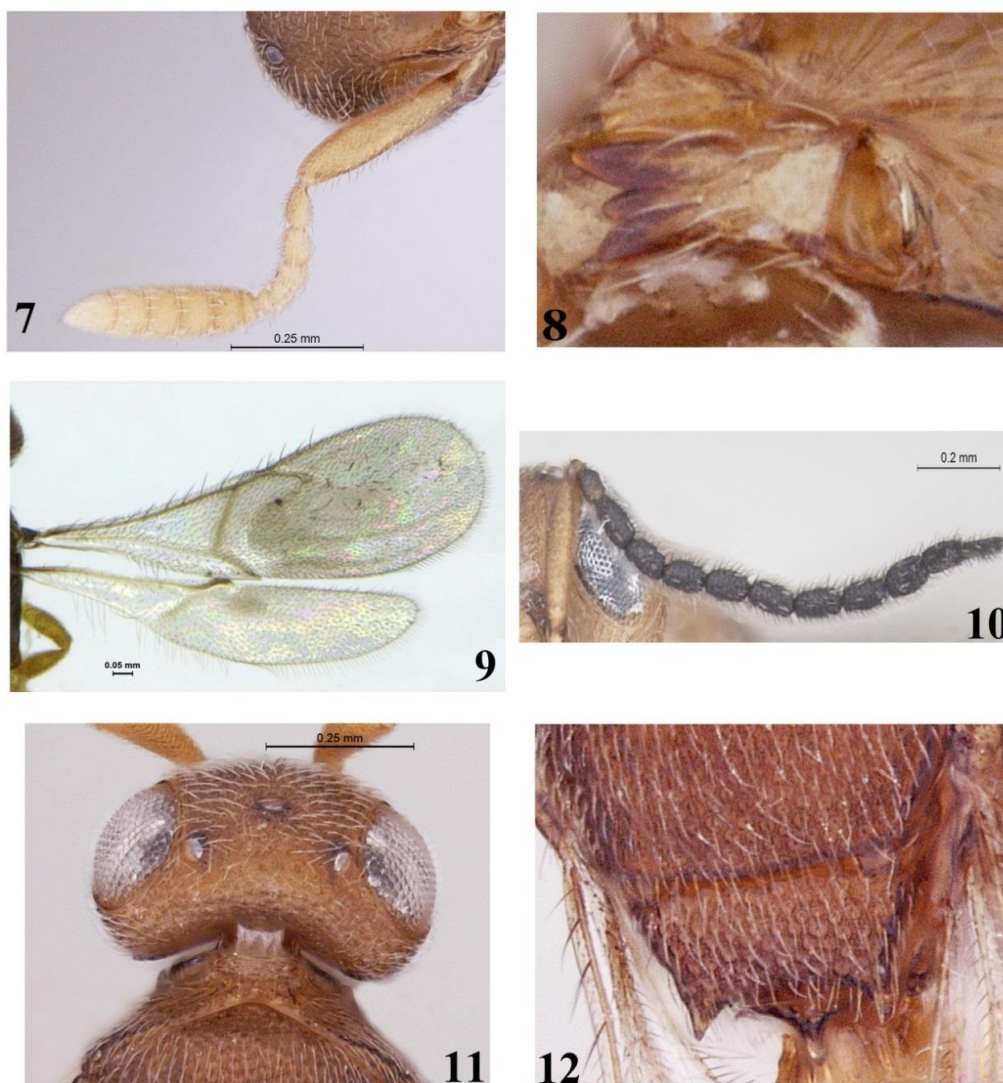
Description: Body 1.78 mm (m=1.694 mm (1.31-2.134 mm), SD=0.314, n=15); moderately robust (Figs 1, 2). Head and body in various shades of pale to blackish brown. Head

subellipsoidal, transverse in dorsal view; upper frons, vertex and occiput with large, round and closely placed setigerous tubercles separated by sinuous, narrow furrows (Figs 5, 6, 8, 14); densely setose, except on lower median frons; occipital carina present, crenulate; eyes large, longer than temples, finely and densely pubescent; lateral ocelli much closer to orbital margin than to median ocellus; OOL< POL (Figs. 8, 14); frons above toruli slightly convex and without frontal depression; interantennal process raised and with a pronounced curve; facial striae distinct; central keel present, reaching mid eye level (Figs. 5, 16); clypeus narrow, transverse, more than 3× as long as wide; mandibles short and wide, subtridentate, upper tooth longer than median and lower teeth (Fig. 11). Antenna with 12 antennomeres in both sexes; clava with 6 clavomeres (Figs. 7, 16); male antenna filiform (Fig. 10), and A5 carinate.

Mesosoma in dorsal view convex, longer than wide; both mesoscutum and mesoscutellum with similar sculpture as on vertex (Figs. 1, 6, 14); skaphion and notaulus absent; mesoscutellum wider than long, anterior margin crenulate, posterior margin medially emarginate, postero-lateral corners drawn into pointed spines (Figs. 6, 12, 14, 15, 17), derived entirely of mesoscutellar disc; epomial carina present; netrion almost smooth, closed near fore coxa; antero-ventral margin of lateral pronotal area with a thickened ridge; lateral pronotal area almost smooth except for a few incomplete striae on antero-ventral margin and sculpture similar to that of vertex on postero-dorsal margin; mesopleuron with three complete transverse striae beneath tegula; mesopleural depression present; mesepimeral sulcus foveate; metapleuron smooth except for posterior foveae (Fig. 4); propodeum unarmed, lateral propodeal area with large irregular foveae separated by sinuous, narrow furrows, setose laterally; lateral propodeal projections weakly acute; lateral axillar area wide; metascutellum foveate medially with a narrow metascutellar plate (Figs. 15, 17) or with a broad based triangular, medially pointed spine (Fig. 12); scutoscuteellar sulcus wide, posteriorly foveate; tibial spur formula 1:2:2. Fore wing extending beyond tip of metasoma in flexed position; fore wing submarginalis not reaching anterior margin and



Figures 1-6: *Anokha anoojii* sp.n., 1. Habitus (dorsal); 2. Habitus (lateral); 3. Metasoma; 4. Head and pleuron; 5. Frons; 6. Mesosoma (Mesoscutellum showing lateral spines)



Figures 7-12: *Anokha anoojii* sp.n., 7. Female antenna (clava light yellow); 8. Head showing lateral ocelli closer to orbits; 9. Fore and hind wings; 10. Male antenna; 11. Mandible; 12. Mesoscutellar spines and metanotal spine

not curved posteriorly or broken before marginalis; marginalis much shorter than stigmalis and postmarginalis; fore wing stigmalis placed at an angle of 45° from fore wing margin; medialis basalis, discoidalis and analis indicated; medialis and basalis more strongly indicated than the other two; marginal cilia short; thick bristles present on submarginalis, marginalis and postmarginalis; hind wing with submarginalis complete (Fig. 9).

Metasoma with 7 tergites and 8 sternites, spindle shaped, with tip pointed (Figs.

3, 18); widest medially, nearly as wide as mesosoma; metasomal tergites transverse, T1 with a faint antero-medial protuberance; T3 longest and widest; laterotergites narrow; submarginal ridge well impressed; T7 in females exerted along with ovipositor, ovipositor *Scelio*-type.

Male (Body length=1.47 mm), similar to female except in the genitalia, number of external tergites and antennae.

Anokha anoojii Rajmohana & Veenakumari,
sp. n. (Figs 1-12)

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Description

Holotype: Female. Body length=1.77 (m=1.93 mm (1.41-2.134) SD=0.239, n=8).

Color: Yellowish brown to dark brown; basal antennomeres and legs pale; antenna yellowish brown, clava pale yellow to brownish black; region adjacent to ocelli, with dark patches; mandibles pale with teeth dark brown; wings hyaline, veins brown (Fig. 1).

Head: FCI=1.03; LCI=1.85; length and width of eye in ratio of 23:15.3; IOS slightly less than eye height (29:31); setigerous tubercles on frons not much pronounced as on mesosoma; interommatidial setae short, 1.7 times as long as the diameter of a single ommatidium, but only half as long as those on vertex; OOL<LOL<POL in ratio of 0.7:10.5:19.5; A2 1.25× as long as A3, nearly 1.5× as long as wide; A3–A4, A7–A12 with four rows of sensilla; clava 1.10× as long as A1; length and width of antennomeres A1–A12 in ratio of 26.6:6.2, 7.1: 3.4, 5.7: 3.4, 3.7:3.4, 2.6: 2.9, 2.1: 2.6, 3.1: 4.7, 4.8: 6.2, 4.6: 6.4, 4.6: 6.4, 4.6: 6.3, 4.8: 5.9 (Fig. 7).

Mesosoma: (L:W=58:55.2). Forewing (L:W=103.4:36.0) and hind wing (L:W=95:13) densely covered with microtrichia (Fig. 9); length of marginalis: stigmalis: postmarginalis of fore wing in ratio of 3.9:8.4:13.3; basal hind wing marginal cilia long, 0.57× width of wing while those towards apex are short, 0.25× width of wing.

Metasoma: (L:W=55.3:33.0); T1–T3 costate, costae reaching posterior margin of tergites; T2 with basal foveae; T2 posteriorly, T3 both anteriorly and posteriorly smooth; T4 onwards punctate; T2 and T3 densely setose laterally, while remaining tergites entirely covered with setae; length and width of tergites T1–T7 in ratio of 7.5:12.7, 12.0:26.4, 22.5:30.7, 10.14:28.9, 5.3:23.5, 7.0:17.1, 7.2:3.7, respectively (Fig. 3).

Male: Body length=1.47 mm, (n=1); color same as in females, except tip of metasoma being darker. Antenna with short brownish-white setae and sparse long white setae (Fig.10); length and width of antennomeres A1 to A12 in ratio of 36.6:6.9, 9.7:5.2, 10.8:6.2, 9.3:5.4, 10.4:5.9, 10.4:5.9, 10.9:5.8, 12.1:5.6, 11.0:6.1, 10.2:6.9, 9.8:5.9, 11.5:6.1, respectively.

Type material: Holotype: Female, (ZSI/WGRS/IR.INV.4291), INDIA: Kerala: Kozhikode, Kakkavayal, (11°63'38"N, 76°10'28"E), 23.xi.2011, Bijoy, C., MT. Paratypes: 1 female, (ZSI/WGRS/IR.INV.4290), Kerala: Kozhikode, Medical College Campus, (11°27'18"N, 75°83'65"E), 27.vii.2005, Rajmohan, MT; 1 male, (ZSI/WGRS/IR. INV6554), Kerala: Trivandrum, Amburi, (8°78'63"N, 77°31'91"E), 13.xii.2015, Rajmohana, SN; 7 females, (ICAR/NBAIR/ P868, P869, P870, P871, P872, P873, P874), Kerala: Trivandrum, Pattom, (8°52'05"N 76°94'22"E) 18.vii.2015, Anooj, S.S., YPT.

Etymology: The species is named '*anoojii*' after Anooj, S. S., Scientist, IARI, New Delhi who collected a long series of paratypes.

Anokha nigra Rajmohana sp. n.
(Figs 13-18)

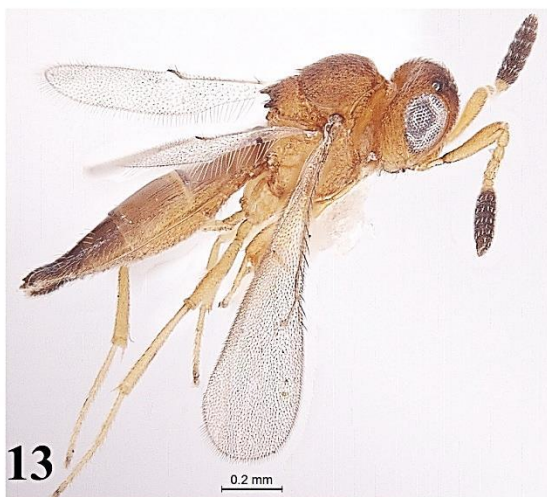
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Description

Holotype: Female. Body length=1.38 mm (m=1.424 mm (1.31-1.49 mm), SD=0.06, (n=7)).

Color: Honey brown; basal antennal segments and legs including coxae pale; vertex and tip of metasoma darker; antenna yellowish brown, A8–A12 brownish black dorsally and pale brown ventrally; antero-median protuberance on T1 black (Fig. 13).

Head: FCI=1.05; LCI=2.0; IOS 1.3× eye height; setigerous punctae on frons not much pronounced as on mesosoma; OOL and ocellar diameter almost subequal; OOL>LOL>POL in



Figures 7-12. *Anokha anoojii* sp.n.: 7. Female antenna (clava light yellow); 8. Head showing lateral ocelli closer to orbits; 9. Fore and hind wings; 10. Male antenna; 11. Mandible; 12. Mesoscutellar spines and metanotal spine

ratio of 7:27:52; A2 and A3 subequal in length, nearly 1.5× as long as wide; A3–A4, A7–A12 with four rows of sensilla; clava 1.3× as long as A1; length and width of antennomeres A1–A12 in ratio of 22.1:5.3, 5.0:3.7, 4.6:3.9, 3.3:3.9, 2.6:3.8, 2.1:3.8, 3.1:4.9, 4.9:6.1, 4.9:6.6, 4.4:6.6, 4.5:6.3, 4.6:4.2, respectively (Fig. 16).

Mesosoma: (L:W=37.8:35.8); interstices between setigerous tubercles on mesoscutellum, narrow and less granulate; metascutellum with a narrow median plate instead of spine (Fig. 15, 17). Forewing (L:W=11.2:3.1) and hind wing (L:W=7.4:1.5) with dense microtrichia; ratio of length of marginalis: stigmalis: postmarginalis of forewing in ratio of 1.2:3.6:5.0; hind wing marginal cilia 0.58× width of wing.

Metasoma: (L:W=90:35.5); T1–T3 costate, costae almost reaching posterior margin of tergites; T2 posteriorly and T3 both anteriorly and posteriorly smooth; T2–T5 densely setose laterally; T4–T5 smooth, devoid of any sculpture, T6 with corrugations; length and width of tergites T1–T7 in ratio 12.2:17.7, 17:32.4, 25.5:35.5, 12.8:32.2, 8.6:22.7, 9.5:12.3, 6:4.1, respectively (Fig. 18). Remaining characters as in *A. anoojii*.

Male: Length=1.33 mm. Color same as in females, except tip of metasoma being darker. Similar to female except in the genitalia, number of external tergites and antennae. Terminal antennal segments after A5 missing.

Type material: Holotype: 1 Female, (ZSI/WGRS/IR.INV6555), INDIA: Kerala: Kasargod, Kammadam, (12°31'33"N, 75°31'52"E), 29.xi.2015, Sinu, P.A, YPT. Paratypes: 5 females, (ZSI/WGRS/IR.INV6556-6660), with same data as that of holotype; 1 male and 1 female (ZSI/WGRS/IR.INV6661, 6662), Kerala: Kozhikode, Malabar Wildlife Sanctuary, (11°56'63" N, 75°06'95" E), 29.xii.2015, Ranjith, AP, SN.

Etymology: The species is named '*nigra*' for its black antero-median protuberance on T1 and clavomeres A8–A12.

Remarks: *A. anoojii* and *A. nigra* differ in the following characters. The median metascutellar spine is distinct in *A. anoojii*, but in *A. nigra* metascutellum is represented as a narrow plate medially. T4 and T5 with numerous fine

setigerous punctae in *A. anoojii*, while it is smooth without any punctae in *A. nigra*.

Discussion

The proposed new genus - having a well impressed submarginal ridge, antennae 12 segmented in both sexes, lateral ocelli closer to inner orbits than to median ocellus and fore wing with a distinct postmarginalis - belongs to subfamily Scelioninae as per Masner (1976).

The new genus *Anokha* is similar to the genus *Chakra*, in having large round setigerous tubercles on head and mesosoma, a median metanotal tooth (as in *A. anoojii*), short facial striae and a prominent interantennal process. However, it differs from genus *Chakra* in having a medially emarginate posterior margin of mesoscutellum and postero-lateral corners of mesoscutellum drawn into pointed spines. In *Chakra* the mesoscutellum is without any emargination and spines. Further the lateral ocelli are closer to inner orbits than to median ocellus in *Anokha*, while they are positioned towards median ocellus in *Chakra*. Also, the metasoma is pedunculate with T1 longer than broad in *Chakra*, while in *Anokha* the metasoma is spindle shaped, with T1 transverse. Though *Dichoteleas* has a bispinose scutellum, the spines are not at the postero-lateral corners, but more lateral nearer to tegula. The posterior margin of mesoscutellum is not emarginate either. In *Dichoteleas* female, antenna with 7 clavomeres and A3 in females unusually elongate. This genus also differs from *Neoscelio* in having a distinct postmarginalis. In *Neoscelio*, metascutellum with a long, thin spine which is almost equal to the length of mesoscutellum (Galloway and Austin, 1984) which is not so in *Anokha*. Moreover *Neoscelio* is restricted in its distribution to Australia.

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