

Research Article

A Revision of Oriental Species of *Psilocera* Walker (Hymenoptera: Chalcidoidea: Pteromalidae) with Descriptions of Two New Species from Namdapha National Park, Arunachal Pradesh, India

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The Oriental species of *Psilocera* Walker (Hymenoptera: Chalcidoidea: Pteromalidae) is revised, and two new species, namely, *P. namdaphaensis* sp.nov. and *P. intermedia* sp.nov. are described from Arunachal Pradesh, India. The affinities of the new species with the other known species are discussed. Systematic account of the Oriental species of *Psilocera* and a key to separate them are also provided.

1. Introduction

The genus *Psilocera* Walker belongs to the subfamily Pteromalinae of Pteromalidae (Hymenoptera: Chalcidoidea) and is known for 28 described species throughout the world with seven species known from the Oriental Region [1–3]. Sureshan [2] synonymised the genus *Acanthometopon* Ashmead under *Psilocera*, based on the close resemblance of the two genera except for the characteristic humped scutellum with a stout fingernail like tip in the former. He also described two other species, namely, *P. scutellata* and *P. heydoni* with a similar scutellum from India. Narendran and Kumar [3] described the species *P. neoclavicornis* from West Bengal, India with a humped scutellum. There is a gradation observed in the length of the conical hump and the sharpness of the finger nail tip of scutellum in all these species. It may now be assumed that the genus *Psilocera* contains two species groups, one with a normal scutellum and the other with the scutellum produced in the form of hump with a distinct finger nail-like tip. Boucek [4] had opined that *Acanthometopon* may constitute a subgenus of *Psilocera*.

During the faunal exploration surveys undertaken in the Namdapha National Park, Arunachal Pradesh (27°23′

to 27°39′ N Latitudes and 96°15′ and 96°58′ E longitudes) one of the important biodiversity areas in India, interesting specimens of the genus *Psilocera* Walker were collected. The collections were made from an evergreen forest patch by sweeping over the leaf litter on the forest floor with an insect net. On detailed studies, the specimens were proved to belong to two undescribed species which are described hereunder. Affinities of these species with other known species are discussed. Systematic account of the other species of *Psilocera* known from the Oriental Region and a key to separate them are also provided (see Table 1). The type specimens are deposited in Zoological Survey of India, Western Ghat Regional Centre, Calicut, Kerala, India (ZSIC).

The morphological terminology used in this paper follows that of Boucek [4] and the following abbreviations are used in the text: BMNH: The Natural History Museum, London, U.K.; F1–F6: funicular segments 1 to 6; MV: marginal vein; NZSI: National Zoological Collections of Zoological Survey of India, Kolkata; OOL: ocellular distance; PMV: postmarginal vein; POL: postocellar distance; SMV: submarginal vein; STV: stigmal vein; USNM: United State National Museum, Washington, DC, USA.

TABLE 1: Key to the Oriental Species of *Psilocera* Walker (Based on Females, Modified from Sureshan 2000).

(1) Scutellum with a conical hump bearing a fingernail like tip (Figure 1(i–k))	2
–Scutellum normal, without conical hump	6
(2) Scutellum with hump long and fingernail sharp and highly projecting (Figure 1(k))	3
–Scutellum with hump short, fingernail not much sharp and projecting as above (Figure 1(i and j))	5
(3) Forewing with basal cell hairy and closed below. Size 4 mm	<i>P. clavicornis</i> (Ashmead)
–Forewing with basal cell not hairy as above, sometimes few hairs at tip and open below	4
(4) Antennae with pedicel as long as F1, scape, pedicel, anelli and three-fourth from base of F1 testaceous, clava shorter than 4 preceding segments combined; gaster 1.72x as long as hind tibia and 0.9x rest of the body. Size 3 mm	<i>P. neoclavicornis</i> Narendran & Girish Kumar
–Pedicel almost 2x F1, F1 black as remainder of antenna, clava longer than four preceding segments combined (Figure 1(e)) gaster 1.4x as long as hind tibia and 0.7x as long as rest of the body. Size 3 mm	<i>P. intermedia</i> sp.nov.
(5) Scutellar hump short (Figure 1(i)) median length of scutellum up to tip of hump 0.73x length of mesoscutum; hind tibial spur long, almost half as long as basitarsus; forewing with PMV 0.72x as long as MV; eyes short, length 1.6x width; gaster dorsally with metallic blue reflection; antenna with scape, pedicel and anelli brown; legs with femora brown. Size 2.7–2.9 mm	<i>P. heydoni</i> Sureshan
–Scutellar hump long (Figure 1(j)) median length of scutellum up to tip of hump 0.82x length of mesoscutum; hind tibial spur short, 0.3x as long as basitarsus; forewing with PMV 0.9x as long as MV; eyes longer, length 1.9x width; gaster dorsally without blue reflection; antenna with scape, pedicel and anelli testaceous; femora testaceous. Size 2.5–3.6 mm	<i>P. scutellata</i> Sureshan
(6) Antennal flagellum strongly clavate (Figure 1(g)); F1 short; antenna except clava testaceous, scape reaching far below level of median ocellus. Size 2.1 mm	<i>P. clavata</i> Sureshan & Narendran
–Flagellum not strongly clavate as above; F1 not as above; antennae with scape, pedicel, anelli, and F1 testaceous, remainder brownish black; scape just short of reaching or just touching median ocellus	7
(7) Malar grooves not distinct. Antenna with clava shorter than three preceding segments Combined; gaster long, 0.93xs as long as head plus thorax combined; scutellum without long hairs or bristles. Size 2.5 mm	<i>P. ghanii</i> Subba Rao
–Malar groove distinct, clava as long as or longer than three preceding segments combined; gaster 0.7–0.8x as long as head plus thorax combined; scutellum with long white hairs or black bristles	8
(8) Clava as long as three preceding segments combined; scape distinctly reaching median Ocellus (Figure 1(a)); gaster, 0.8x as long as head plus thorax combined; scutellum with long white bristles, Size 1.6–2.4 mm	<i>P. vinayaki</i> Sureshan & Narendran
–Clava as long as 3.5 preceding segments combined (Figure 1(c)); scape just short of reaching median ocellus; gaster, 0.7x as long as head plus thorax combined; scutellum with long black bristles. Size 2.8–3 mm	<i>P. namdaphaensis</i> sp.nov.

2. (1) *Psilocera namdaphaensis* sp.nov. (Figures 1(c, d) and 2)

Description. Female: length 2.8–3 mm. Head and thorax black without metallic reflection, gaster brownish black with metallic bluish reflection dorsally. Antennae with scape, pedicel, and F1 testaceous, remainder brownish black, upper one third of scape darker; eyes violet black, ocelli brown; mandibles brown. Coxae concolorous with thorax, fore femora brown, rest of legs testaceous with tips of tarsi brown. Tegulae brown, wings hyaline, veins and pubescence brown.

Head. In dorsal view 2.21x as broad as long; POL 0.9x OOL; temple 0.5x eye length; vertex sharply declivitous; in front view head width 1.3x height; eyes separated 1.5x their length at the level of toruli; malar space 0.6x eye length in front view; anterior margin of clypeus with two distinct teeth, radiately striated, striae reaching almost up to base of eye, face moderately reticulate, except for a broad shining area above clypeus; pubescence white, sparse, denser on lower part of face; scrobe deep, reaching median ocellus.

Antennae (Figure 1(c)) inserted below middle of face, scape just short of reaching median ocellus by a distance which is slightly shorter than its diameter, scape 0.7x eye length, pedicel as long as F1, pedicel plus flagellum 0.9x head width, flagellum strongly clavate, anelli transverse, second little longer than first; F1 as long as F2, all funicular segments with one row of long sensillae; F1–F3 longer than broad, equal, F4 quadrate, little shorter than F3; F5–F6 transverse, little shorter than F4, clava 2x as long as broad, little shorter than 4 preceding segments combined sutures of club oblique, clearly distinct, micropilosity area reaching base of third segment.

Thorax. Highly convex, sparsely pubescent and with sparse brown backwardly directed bristles. Pronotal collar finely reticulate, anteriorly carinate in the middle. Mesoscutum and scutellum distinctly reticulate punctuate. Mesoscutum 2.3x as broad as long, notauli incomplete. Scutellum medially as long as mesoscutum, without any conical projection, frenum clearly marked. Axialle and axillulae finely reticulate. Dorsellum narrow, very finely reticulate. Propodeum finely reticulate, median carina and costula

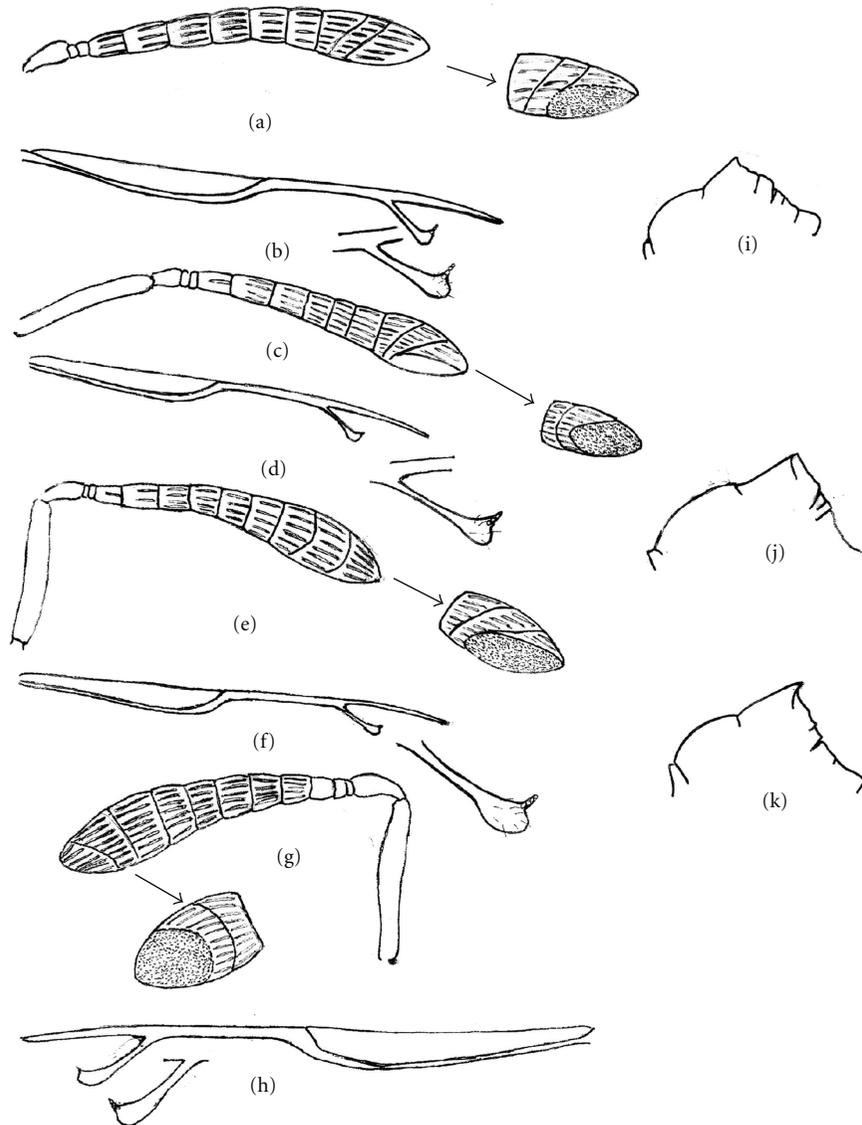


FIGURE 1: (a) *Psilocera vinayaki* Sureshan & Narendran, female antenna, (b) forewing venation; (c) *Psilocera namdaphaensis* sp.nov. female antenna, (d) forewing venation; (e) *Psilocera intermedia* sp.nov. female antenna, (f) forewing venation; (g) *Psilocera clavata* Sureshan & Narendran female antenna, (h) forewing venation; (i) *Psilocera heydoni* Sureshan female profile view of thorax; (j) *Psilocera clavata* Sureshan female, profile view of thorax; (k) *Psilocera intermedia* sp.nov. female. profile view of thorax.

distinct and complete, plicae indicated only in anterior half, spiracles long, oval almost touching hind margin of metanotum, postspiracular sulcus deep, callus with long thick white pubescence. Propodeum medially 0.8x as long as scutellum, in dorsal view 2.4x as broad as long. Lower half of metapleuron finely reticulate, upper half moderately reticulate. Mesopleuron moderately reticulate with a broad triangular shiny area below hind wings. Prepectus small, narrow, fine, as long as tegula. Forewing (Figure 1(d)) 2.3x as long as broad, marginal fringe very small, almost indistinct, pubescence moderate, basal cell open below with 2 or 3 scattered hairs at the tip, basal hairline indicated, costal cell completely hairy on the top, speculum open below. Relative lengths SMV 49, MV 32, STV 11, and PMV 22. Legs slender, hind coxae densely hairy on anteriolateral margins, 1.3x as

long as broad, femora 5x as long as broad, tibiae as long as femora, hind tibia with two spurs.

Gaster. Lanceolate, shorter than thorax, dorsally collapsing, petiole distinct, gaster, in dorsal view 2.1x as long as broad, hind margin of T1–T3 deeply incised medially, T4 emarginate.

Material Examined. Holotype: Female (on card) India: Arunachal Pradesh, Namdapha National Park, Firmbase road, way to Daphabum, N 27°31'31.1'' E 96°30'20.7'', 9.xi.2009, Coll.P.M.Sureshan (Reg. no. ZSI/WGRS/IR-INV/2070). Paratypes: 2 Female (on card), same data as that of holotype except way to Ranijheel, N 27°32'20.3'' E 96°29'17.5'' 11.xi.2009, coll.P.M.Sureshan (Reg. no. ZSI/WGRS/IR-INV/2071, 2072).

Biology. Not known. Collected from leaf litter on forest floor.

Etymology. Named after the locality, Namdapha National Park, Arunachal Pradesh from where the specimens collected.

Remarks. In the Key to Western European species of *Psilocera* [5], the new species runs in to couplet 5 with *P. crassispina* (Thomson) and *P. confusa* Graham. In having strongly clavate antenna, clava with micropilosity area reaching two thirds of length, (up to base of third segment) F1 as long as pedicel, POL 0.9x OOL, and larger body size, it resembles *P. crassispina* but differs from it in having forewing with basal cell bare, at most with 1-2 setae, antennae with scape, pedicel, anelli, F1 and F2 partly testaceous (in *crassispina* forewing with basal cell pilose with 7–12 setae, antennae with scape pedicel and anelli red with pedicel slightly infuscate dorsally). It differs from *P. confusa* in having POL 0.9x OOL, and body size large 2.8–3 mm (in *confusa* POL 1.0–1.5x OOL, body size small 1.7–2.8 mm). Among the oriental species, it resembles *P. vinayaki* Sureshan & Narendran in general morphology but differs from it as given in the key.

3. (2) *Psilocera intermedia* sp.nov. (Figures 1(e, f) and 3)

Description. Female: length 3 mm. Head and thorax black; gaster brownish black with metallic bluish reflection. Antennae with scape, pedicel and anelli testaceous, remainder brown; eyes dark cupreous. Coxae except middle one concolorous with thorax, middle coxae brownish, remainder of legs testaceous with tips of tarsi brown. Tegulae brown, wings hyaline, veins and pubescence brown.

Head. Face moderately reticulate except for a broad shining area above clypeus; pubescence white, sparse, denser on lower part of face; in dorsal view, head 2.3x as broad as long; POL 1.4x OOL; temple length 0.5x eye length; vertex declivitous; head in front view width 1.3x height; eyes separated 1.3x their length at the level of toruli; malar grooves distinct; malar space 0.54x eye length in front view; anterior margin of clypeus with two distinct teeth, radiately striated, striae reaching almost up to base of eye; scrobe deep, reaching median oculus. Antennae (Figure 1(e)) inserted below middle of face, scape hardly reaching median ocellus, length 0.73x eye length, pedicel almost twice F1, pedicel plus flagellum 0.9x head width, flagellum strongly clavate, anelli transverse, second slightly longer than first; F1 0.8x F2, F3 almost equal to F2, F4, and F5 equal, little shorter than F3, F6 shortest; clava slightly longer than 4 preceding segments combined with broad area of micropilosity reaching base of third segment, sutures strongly oblique.

Thorax. Highly convex, sparsely pubescent and with sparse brown backwardly directed bristles. Pronotal collar finely reticulate, anteriorly carinate in the middle. Mesoscutum and scutellum distinctly reticulate punctuate. Mesoscutum 2.1x as broad as long, notauli incomplete. Scutellum with a strong finger nail-like tip, medially as long as mesoscutum (base to tip of finger nail), frenum clearly separated.



FIGURE 2: *Psilocera namdaphaensis* sp.nov. female.

Axialle and axillulae finely reticulate. Dorsellum narrow, very finely reticulate. Propodeum finely reticulate; median carina and costula fine but distinct, median carina interrupted by costula, plicae indicated only in anterior half, spiracles small, oval, separated from hind margin of metanotum by own diameter, postspiracular sulcus distinct, not deep, callus with long thick white pubescence. Propodeum medially 2.9x as broad as long. Metapleuron finely reticulate. Mesopleuron moderately reticulate with a broad triangular shiny area below wings. Prepectus small, narrow, fine, as long as tegula. Forewing (Figure 1(f)) 2.2x as long as broad, marginal fringe very small, almost indistinct, pubescence moderate, basal cell open below without hairs, basal hairline indicated by few hairs; costal cell hairy on the upper half on the ventral side, complete at tip speculum open below. Relative lengths SMV 51, MV 30, STV 10.5, and PMV 26. Legs slender, hind coxae densely hairy on anterior-lateral margins, a tuft of long white hairs in the distal half of posterior lateral margin, 1.6x as long as broad. Relative lengths of hind coxa 18, femur 40, tibia 43.

Gaster. Short, lanceolate, petiole not distinct, 0.7xs as long as rest of the body and 1.4x as long as hind tibia, dorsally collapsing, in dorsal view 2.3x as long as broad, hind margin of T1–T3 incised medially, T4 emarginate.

Male: length 1.7 mm. Resembles female except for the small body size and the nature of antenna with two short anelli and pedunculate funicular segments each bearing two whorls of long hair, gaster collapsing.

Material Examined. Holotype: female. India: Arunachal Pradesh, Namdapha National Park, Firm base road, way to Ranijheel, N 27°32'20.3" E 96°29'17.5", 13.xi.2009, (Reg. no. ZSI/WGRS/IR-INV/2073). Paratype: male same data as that of holotype except 12.xi.2009, coll.P.M.Sureshan (Reg. no. ZSI/WGRS/IR-INV/2074).

Remarks. Among *Psilocera* species with a conical hump on scutellum *P. clavicornis* (Ashmead), *P. intermedia* sp.nov. and *P. neoclavicornis* Narendran & Girish Kumar. share a long and projecting finger nail tip on scutellum. The new species closely resembles *P. clavicornis* but differs from it in having



FIGURE 3: *Psilocera intermedia* sp.nov. female.

forewing with basal cell open below and without any hairs, MV short, 2.8x STV, gaster short, only 0.7x as long as rest of body and 1.4x as long as hind tibia, antennae with only scape, pedicel and anelli testaceous and rest brownish black, F2 0.8x F1 (in *clavicornis* forewing with basal cell closed below with several scattered hairs inside, MV long, 3.4x STV, gaster long, 1.9x as long hind tibia and 0.8x as long as rest of the body, antennae with scape, pedicel, F1 and F2 testaceous and F2 as long F1). The new species also resembles *P. neoclavicornis* in general morphology, but *neoclavicornis* differs from it in having shorter antennae with scape hardly reaching median ocellus, clava shorter than 4 preceding segments combined, scape pedicel anelli and most of F1 testaceous and rest dark brown, finger nail tip of scutellum slightly shorter, forewing with MV long, 3.14x as long as STV, and gaster long 1.72x as long as hind tibia and 0.9x as long as rest of the body.

Etymology. The species name derived from the intermediate nature of morphology with the other two species compared.

4. (3) *Psilocera vinayaki* Sureshan and Narendran (Figure 1(a, b))

See [6, 7].

Diagnosis. Length 1.6–2.4 mm. Head and thorax bluish black, gaster bluish black with metallic blue reflection on dorsal and lateral sides; antennal scape reaching median ocellus, clava as long as three preceding segments combined; POL 1.1x OOL; forewing (Figure 1(b)) with basal cell open below without hairs, thorax distinctly raised reticulate with long sparse white hairs, gaster as long as thorax, T1–T3 covering most of the gaster.

Distribution. India: Kerala, Bihar.

Remarks. Among the Indian species with simple scutellum, *P. vinayaki* is the smallest, which is described from Kerala and distributed throughout Kerala. Recently, the species has been collected from Bihar, India (communicated) which is the only report of the species after the original description.

5. (4) *Psilocera clavata* Sureshan and Narendran (Figure 1(g, h))

See [8, 9].

Diagnosis. Length 2.1 mm. Head and thorax black, gaster blackish brown. Antennae testaceous except club black. Antennae (Figure 1(g)) inserted below middle of face, scape never reaching median ocellus, second anellus longer than first, F1 short, clava as long as 3.5 preceding segments combined; forewing with basal part almost bare.

Distribution. India: Kerala.

Remarks. The species is known only from the holotype described from Kerala. Among the species with normal scutellum, *P. clavata* has a strongly clavate antenna and F1 short.

6. (5) *Psilocera scutellata* Sureshan (Figure 1(j))

See [10, 11].

Diagnosis. Length 2.5–3.6 mm. Body black except gaster dark brown. Antennae with scape, pedicel anelli F1, and base of F2 testaceous, rest black. Scape touching median ocellus, clava as long as four preceding segments combined; scutellum (Figure 1(j)) with a conical hump with finger nail-like tip not prominent; forewing with basal cell open below with few hairs at the tip.

Distribution. India: Kerala

Remarks. The species possess a highly convex scutellum with finger nail-like tip less prominent, sharpness of which is distinctly less than *P. clavicornis*, *P. intermedia*, and *P. neoclavicornis*.

7. (6) *Psilocera heydoni* Sureshan (Figure 1(i))

See [12, 13].

Diagnosis. Length: 2.7–2.9 mm. Head and thorax black, gaster blackish brown with metallic blue reflection dorsally; antennae with scape, pedicel and anelli brown rest black, scape just reaching median ocellus, clava little longer than 4 preceding segments combined; hump of scutellum short, median length of scutellum up to tip of hump 0.73x length of mesoscutum.

Distribution. India: Karnataka.

Remarks. The species is known only from the type specimen collected from Coorg district of Karnataka, India. Among the species with a humped scutellum; the projection of the hump is minimum in *P. heydoni*.

8. (7) *Psilocera clavicornis* (Ashmead)

See [14–16].

Diagnosis. Length 4 mm. Head and thorax black, gaster brownish black with metallic blue reflection dorsally; antennae with scape, pedicel, anelli, F1 and F2 testaceous, rest brown. Antennae with scape just reaching median ocellus, clava as long as 4.5 preceding segments combined. Scutellar hump long and finger nail tip sharp and highly projecting. Forewing with basal cell closed below and hairy.

Distribution. Brazil (Corumba), Sri Lanka, China (Hainan Island), Laos (Vietnam Province).

Remarks. In the group with a humped scutellum *P. clavicornis* possesses a highly conical scutellum with the finger nail tip long and sharp and projecting, basal cell of forewing closed below. The species is described from Brazil, and also known from Sri Lanka, Laos, and China (Hainan).

9. (8) *Psilocera ghanii* Subba Rao

See [17, 18].

Diagnosis. Length 2.5 mm. Head and thorax black, gaster metallic bluish green. Malar grooves indistinct; antennal scape just short of reaching median ocellus, club shorter than three preceding segments combined, gaster 0.93x as long as head plus thorax combined.

Distribution. Pakistan (Babakewal).

Remarks. The species is known only from the holotype described from Pakistan. This is the only oriental species with a host data. The species was reared from the larvae of leaf beetle *Cryptocephalus faustus* Suffrain on *Tamarix dioica* [19].

10. (9) *Psilocera neoclavicornis* Narendran and Girish Kumar

See [20].

Diagnosis. Length 3 mm. Black; antennae with scape, pedicel, anelli, three-fourth of F1 from base pale brownish yellow, rest black. POL 1.8x OOL; malar grooves distinct; antennae with scape reaching median ocellus, pedicel as long as F1, clava longer than three preceding segments combined; scutellum with hump pronounced and fingernail tip distinct.

Distribution. India: West Bengal.

Remarks. In having scutellum with distinct hump and distinct fingernail tip this species closely resembles *P. clavicornis* (Ashmead) and *P. intermedia* sp.nov.

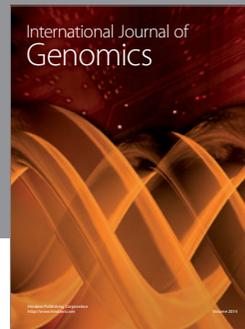
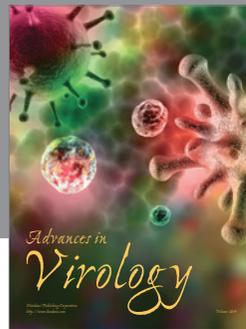
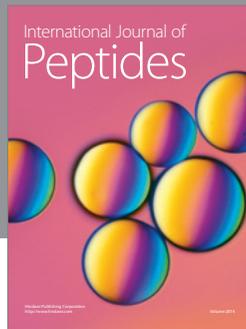
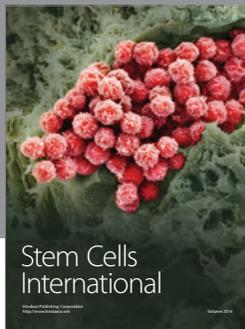
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