JOPPINI (HYMENOPTERA: ICHNEUMONIDAE)
OF TARAPACA¹

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ABSTRACT

Only 2 genera and 4 species of Joppini inhabit northernmost Chile's
desertic Tarapacá Province. Carinodes fulgor n. sp. and Thymebatis hichinsi
n. sp. are restricted to the west Andean slopes between 3 and 4000 m altitude.
Thymebatis hichinsi n. sp. occurs from 0 to 2700 m in scattered oascs and
fertile river valleys. Carinodes vargasi n. sp. has been collected only from
the Azapa Valley near Arica. Thymebatis hichinsi parasitizes an alfalfa
cutworm, Copitarsia consueta Walker (Lepidoptera: Noctuidae), but hosts
of the other Tarapacá Joppini remain unknown.

Aided by the Departamento de Agricultura of the Universidad del Norte
at Arica, Chile, I have spent 11 weeks during June and July of 1975, '76, '77,
and '78 collecting and studying ichneumonids in the coastal desert, foothills,
and west Andean slopes of Chile's northernmost Tarapacá Province. This
winter field work was supplemented by 12-month Malaise surveys conducted
in the Azapa Valley (250 m), at Timar (1850 m), near Socoroma (3000 m),
and at Chapiquiña (3370 m). A fairly complete sample of north Chilean
Ichneumonidae thus was amassed, together with data on various aspects of
their natural history. Recently, I monographed the Tarapacá Ephiiltinae
(Porter 1979) and now follow the Initial contribution with a review of the
Tribe Joppini of the Subfamily Ichneumoninae.

The Joppini (Townes 1966: 318) comprise an immense assemblage of
mostly large and colorful ichneumonids, which attack lepidop trovus larvae
or pupae. Joppines abound in both temperate and tropical forests but are
scarce in arid zones. The Neotropic Joppini include 42 genera and thousands
of species (90% undescribed). They are centered in upland or cool wet
forests, such as those of southeast Brasil, the eastern Andes from Colombia
to Argentina, and the Middle American orographic system. Predictably, the
Peruvian-North Chilean Coastal Desert has a depauperate joppine fauna.
Only 12 genera and 15 species have been reported from the entire region, and
only 2 genera and 4 species reach north Chile. There, rainfall along the
coast is less than 1 mm a year and the highlands, although more verdant
(up to 500 mm of rain per year), begin to receive substantial precipitation
only above 3000 m where nightly frosts pose a severe limiting factor for
thermophile biota.

All Peruvian and Chilean Coastal Desert joppine species appear to be
demic. Those few (4 or 6 species) which range up to more than 3000 m
may be found also across the central Peruvian and Bolivian Andes or even
into northwest Argentina, just as happens with such mesostenines as

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Trachysphyrus venustus Myers (Porter 1967: 318) or ephialtines like Tromatobius hübneri Röthes (Porter 1979: 170) and Coecygomimus oropha Porter (Porter 1979: 172). Generically, in contrast, this fauna shows no endemics, including under widely distributed taxa (Maturu, Lobacris, Eurydacus, Tricholabus, Carinodes, Limonethe, Tragomorpha, Conopgy, Hemioplis, Setanta, Diphys, and Thymebatis). East of the Andes, all these genera except Eurydacus (Mexico to Perú) reach as far south as Argentina or Brazil. West of the Andes, however, only Carinodes and Thymebatis attain north Chile, while none of the remaining 10 joppines as yet has been collected south of Lima, Perú. Significantly, the 10 genera known only from Lima northward all are more or less hygrophyte. The majority (Maturu, Lobacris, Eurydacus, Limonethe, Tragomorpha, Conopgy, and Hemioplis) appears to be of Neotropic sylvan origin and nowhere reaches altitudes of more than 2000 m, although all have species which penetrate subtropical or warm-temperate habitats on the northern and/or southern fringes of the Neotropics. Therefore, the density independent factors which prevent these 10 genera from reaching north Chile may be at least threefold: (1) intolerance of aridity, (2) sensitivity to frost, and, in particular, (3) failure to tolerate the high Andean temperature cycle in which “summer” (18-20° C) comes almost every day of the year while every night (near 0° C) brings “winter”. This last factor may be especially important, since most of these genera seem able to endure lowland temperate climates with frost only during certain months (e.g., the eastern U. S. species of Lobacris, Limonethe, Tragomorpha, and Hemioplis). Carinodes (although also of tropical sylvan origin) and the temperate to subtropical-adapted Thymebatis, on the other hand, have numerous species that reach 3000-4000 m in parts of the Andes. These have become adjusted to a life style which involves “hibernating” in grass clumps or under stones during the frigid nights and quickly resuming activity in the sunny days with their mild temperatures and brutal insolation. Carinodes and Thymebatis thus have been able to reach north Chile along the 2000-3000 m high “green belt” of xeric steppe and scrub that stretches, ever higher, narrower, and more depauperately along the western Andes south of Lima, Perú.

Carinodes and Thymebatis also have invaded the temperate woods of Neantarctic Chile. These Neantarctic species are all endemic and do not appear related to their north Chilian congeners. South of Tarapacá and down to Atacama, the Chilean desert is so lifeless and the Andean “green belt” so high, cold, and tenuous, that there is almost no present day inter-change between the north and central Chilean faunas.

The Carinodes and Thymebatis currently known from Tarapacá thus seem endemic to the province, although future collecting probably will show that some range farther north along the coast or north and east into the Andes. All of these species are new, and I herewith describe them and summarize what is known of their biology.

**KEY TO TARAPACA GENERA OF JOPPINI**

1. Areola with a percurrent median longitudinal carina; base of propodeum with a small median tubercle; mandible with a lower tooth; thyridium more or less distinct; tip of female gaster sharply pointed (oxypygous) ........................................ Carinodes Hancock
1. Areola without a median longitudinal carina; base of propodeum without a median tubercle; mandible edentate, without a lower tooth; thyridium obsolete; tip of female gaster blunt (amblypygous) ........................................... Thymebatis Brèthes

Genus Carinodes Hancock

Heinrich (1977: 260) classified Carinodes in the Melanichneumon group of his Subtribe Craticheumonina. The habitus of these species, together with structural features, such as their more or less punctate postpetiole and baso-medially micro-tuberculate propodeum, seem to justify Heinrich's placement. Indeed, there is only 1 unequivocal character which separates Carinodes from the other melanichneumonines. That is the median longitudinal carina of the areola, a feature almost unique among New World Joppini.

Townes (1966: 255-8) assigns 31 names to Carinodes, but my own Neotropical field work and study of museum collections convinces me that the true number of species may approach 500. In tropical wet forests, Carinodes may be one of the most abundant and diverse ichneumonid genera, rivaling the huge mesostenine assemblages Polycyrtus, Cryptana, and Lymanea. However, Carinodes also occurs, if less abundantly, in such marginal regions as Florida, south Texas, up to 4000 m in the Andes of Perú and Bolivia, in the Argentine deserts, the Peruvian Coastal Desert, and in the Nothofagus woods of Neantarctic Chile. This wide ecological tolerance is accompanied by morphological and chromatic plasticity, and future studies may show the necessity of dividing Carinodes into many genera. Heinrich (1977: 260-5) already has begun to split the southeast North American species, but any comprehensive subdivision of Carinodes must await analysis of the immense Middle and South American faunas.

Key to Tarapaca Species of Carinodes

1. Dark metallic blue, male gaster bright red; wings brownish; ocellocular line 1.3-1.6 diameter of hind ocellus; propodeal spiracle 3.0-4.5 as long as wide; gastrocoeli well defined, with sharp rugae, their thyridia 7.0 as wide as long, each thyridium 0.8 as wide as the distance between the thyridia and 0.3 its width removed from base of tergite; base of tergite between gastrocoeli with a transverse band of short, strong, dense longitudinal wrinkles ........................................... 1. Carinodes fulgor n. sp.

1'. Head and mesosoma black with white and brownish markings that are especially profuse in male; gaster mostly fulvous; wings nearly hyaline; ocellocular line 1.0 diameter of hind ocellus; propodeal spiracle 1.5-2.1 as long as wide; gastrocoeli obsolete, without rugae, smooth, polished, and elongate, their thyridia ovoid, 2.0 as wide as long, each one 0.3 as wide as the distance between the thyridia and 1.0 its width removed from base of tergite; base of tergite between gastrocoeli without wrinkles, smooth and shining ........................................... 2. Carinodes vargasii n. sp.
1. Carinodes fulgor Porter, NEW SPECIES
(Fig. 1, 3)

FEMALE. Color: scape dark metallic blue, pedicel and flagellomeres 1-6 or 7 mostly black with 7th flagellomere becoming pale brown below or sometimes largely white; flagellomeres 7 or 8 to 15 or 16, white with dark brown more or less broadly below; succeeding flagellomeres black above and rather pale brown below; head dark metallic blue with shiny brownish black on mandibular condyle and much of mandible, a short white line on vertical orbit opposite hind ocellus, and a slightly longer white line on hind orbit above middle of eye; mesosoma dark metallic blue with a short whitish band on pronotal collar; gaster dark metallic blue with some purplish red reflections and with shiny brownish black briefly on apical rims of tergites and in thyridial area of 2nd tergite or in some specimens with extensive pale red staining laterally on 1st tergite and latero-basally on 2nd tergite; legs dark metallic blue, duller on tibiae and especially tarsi, which, particularly on tips of segments, are more or less brown-stained; anterior aspect of front tibia broadly and percurrenty cream-white, with a little shiny brownish black on apices of trochanters and trochantelli and based on front and mid femur, with bright to dull reddish brown on basal 1/5 or less of mid tibia; hind femur shiny red, sometimes with a slight dusky tinge on apex, and hind tibia red with blackish on more or less of apical 1/5, most broadly so within; wings moderately dark brownish with pale metallic reflections, stigma dark brown with a metallic blue tint.

Length of fore wing: 6.2-6.4 mm. Flagellum: 1st segment 2.0-2.2 as long as deep at apex; flagellum with 36-37 segments. Head: temple in dorsal view gently convex, scarcely receding behind eyes, in lateral view at mid-height 1.0 as long as eye and laterally with some large, strong, but widely separated punctures; ocellocular line 1.3-1.6 as long as diameter of hind ocellus; occiput gently sloping between hind ocelli and occipital carina; dorsal 1/2 of frons, with abundant, variably dense, large, coarse punctures, which in part nearly touch one another and in part are separated by prominent polished interspaces; malar space 0.72-0.75 as long as basal width of mandible; clypeus practically flat throughout, with fairly numerous, widely spaced, large, coarse punctures, its apical margin unmodified, sharp, and almost straight. Pronotum: with much longitudinal wrinkling between epomia and hind margin; humeral margin forming a narrow ledge along mesoscutum. Mesoscutum: smooth and highly polished with moderately numerous, widely scattered, rather large and strong punctures, which become denser only on anterior 1/4 mesad. Scutellum: flat, strongly narrowed rearward. Mesopleuron: lower hind quadrant with very large, deep punctures and some intercalated coarse wrinkling; subalarum rather narrow and ledge-like. Metapleuron: lower division with coarse longitudinal to reticulate wrinkling and irregularly intercalated large, deep punctures, the wrinkled fading out dorsally anteriorly where considerable smooth integument appears among the punctures. Propodeum: spiracle 3.0-4.5 as long as wide; pleural carina fades out on apical 1/2; area-basalis very short and broad, 3.0 or more as broad basally as long; areola with more or less strong reticulate wrinkling in addition to the median longitudinal carina; 1st lateral area smooth and polished with numerous, widely separated, large, strong punctures and 1.3-1.4 as wide as long externally; 2nd lateral area grossly punctoreticulate;
Fig. 1-7. 1) Carinodes fulgor, ♀ Holotype. Dorsal view of apex of 1st gastric tergite and basal part of 2nd gastric tergite. 2) Carinodes vargasi, ♀ Holotype. Dorsal view of apex of 1st gastric tergite and basal part of 2nd gastric tergite. 3) Carinodes fulgor, ♀ Holotype. Dorsal view of propodeum. 4) Thymebatis hypsista, ♂ Holotype. Ventral view of subanal plate. 5) Thymebatis kichinsi, ♀ Paratype, Timar, Tarapacá, Chile. Ventral view of subanal plate. 6) Thymebatis kichinsi, ♀ Holotype. Dorsal view of apex of 1st gastric tergite. 7) Thymebatis hypsista, ♂ Holotype. Dorsal view of apex of 1st gastric tergite.
crista broad and low cuneate, its outer angle weakly projecting and bluntly triangular; hind face of propodeum coarsely punctoreticulate, without definite lateromedian or median longitudinal carinæ. First gastric tergite: postpetiole and apex of petiole smooth and polished with sparse tiny punctures on median field in holotype, but in 1 paratype with large, sharp, and dense punctures on most of median field, laterad and apicad with some mostly well spaced, large punctures, the median field clearly but not sharply differentiated throughout on postpetiole; postpetiole 2.5 as wide apically as long from spiracle to apex. Second gastric tergite: smooth and highly polished with abundant medium-sized, sharp punctures that become dense (touching or nearly so) toward median 1/4 but which laterad average a little to considerably sparser; gastrocoeli shallow but well defined with sharp radiately longitudinal ribs or rugae; thyridia transversely elongate, 7.0 as wide as long, each one 0.8 as wide as the distance between them and 0.3 its width removed from base of tergite; space between gastrocoeli traversed by a prominent band of short, fine, dense longitudinal wrinkles. Scopa: rather large, 0.5-0.6 as long as hind coxa. Wing venation: 2nd abscissa of radius 0.80-0.86 as long as 1st intercubitus.

MALE. Color: scape dark metallic blue; pedicel dark metallic blue grading apically into brown; flagellum brown, very dark above and paler below, especially on basal 1/2; head dark metallic blue with a short white line on vertical orbit and a longer white line ventrad on upper 1/3 of temporal orbit, as well as with shiny brownish black on mandibular condyle and on much of subapical 1/4 of mandible; mesosoma dark metallic blue with a medio-dorsal white band on pronotal collar and sometimes with a white spot on subalarum; gaster bright red, sometimes dusky on dorsal carinæ toward apex of postpetiole, and slightly dusky on apex of last tergite and on parameres; fore and mid legs dark metallic blue, becoming more brownish black on tibiae and tarsi and with paler brown briefly and inconspicuously on apices of trochanters, trochantelli, bases of fore and mid femora, tibiae, and tarsomeres, as well as with anterior face of fore tibia broadly and posteriorly white; hind leg with coxa, trochanter, and trochantellus dark metallic blue with shiny blackish red on apices of trochanter and trochantellus; femur red; tibia a little duller red with metallic blue-tinged black on much of apical 1/6, and tarsus black with apices of segments obscurely pale brown; wings a little less deeply brown-stained than in female.

Length of fore wing: 5.3-6.5 mm. Flagellum: 1st segment 2.1-2.4 as long as deep at apex; flagellum with 34-37 segments; segments 5 and following weakly to definitely nodose with more or less well developed ventral transverse bands of bristles; segments 9 or 10-15 or 16 with obscure, moderately large, ovoid tyloids. Head: Temples in lateral view at mid height 1.0 1.1 as long as eye and laterally with numerous large, coarse punctures which are mostly subadjacent on apical 1/2 but become a little to much sparser anteriad; ocellocular line 1.5-1.6 as long as diameter of hind ocellus; malar space 0.60-0.70 as long as basal width of mandible. Mesoscutum: much more densely punctate than in female, with moderately large, strong punctures that average adjacent to subadjacent on basal 1/2 and become moderately sparser rearward. Scutellum: moderately convex. Subalarum: somewhat inflated and often less ledge-like than in female. Propodeum: spiracle 3.0-3.5
as long as wide; pleural carina stronger than in female, weaker on apical 1/2 but often traceable to apex. First gastric tergite: postpetiole and apex of petiole with large, coarse punctures that average moderately dense but sometimes become much sparser laterad on median field of postpetiole, the median field well differentiated, although the dorsal carinae fade out beyond base of postpetiole; postpetiole 2.1-2.2 as wide apically as long from spiracle to apex. Second gastric tergite: shining and uniformly with large, strong, subadjacent to adjacent punctures or often in large part with the punctures a little reticulately confluent.


**RELATIONSHIPS.** The large and shallow but relatively strong, ribbed gastrocoeli, very broad thyridia, and band of sharp longitudinal wrinkles at the base of the 2nd gastric tergite between the thyridia are some of the characters that distinguish *C. fulgor* from other South American *Carinodes*.

Otherwise, as detailed in the descriptions, *C. fulgor* differs from *C. vargasii* n. sp. (the only other Tarapacá *Carinodes*) not only by the key characters but also in such features as length of 1st flagellomere, number of flagellomeres, length of temple and malar space, much less densely punctate female mesoscutum, much shorter and broader area-basalis, uniformly reticulate hind propodeal face (without definite petiolar area), less densely punctate female 2nd gastric tergite, and even more closely punctate male 2nd gastric tergite.

**FIELD NOTES.** *Carinodes fulgor* inhabits west Andean steppe and scrub between 3000 and 4000 m. In Tarapacá, this habitat receives little more than 100 mm of rain per year, mostly in December to March. According to cloud cover, it experiences daily high temperatures of 12-22° C with nightly lows that hover around freezing. Vegetation here consists mostly of short grass, composites, and cacti but also includes elfin woods of *Polylepis* in some especially humid ravines as well as conspicuous clumps of a giant, plumed grass along streams and irrigation ditches. Most *C. fulgor* were collected by Malaise traps set among the tall plumed grass along streams, and my single hand-captured specimen came from the same habitat.

**MIMICKRY.** *Carinodes fulgor* males much resemble in size and color the sympatrically abundant *Pomphilus dichromorphus* Rohwer (Hymenoptera: Pomphilidae). *Pomphilus dichromorphus* stings painfully while the *Carinodes* seems harmless, so that this relationship may be one of Batesian mimicry.

**PHAENOLOGY.** Monthly figures show that 6 specimens (3 ♀, 3 ♂) were taken in January, 4 ♂ in July, and 2 ♂ in August and September. *Carinodes fulgor* thus seems to emerge in midsummer and continue activity until late winter. Since we have no records for February to June, the species may be bivoltine. In any case, *fulgor* is but one of many highland Tarapacá insects which remains abundant in winter. Although winter low temperatures in the
Porter: Joppini of Tarapaca

highlands average somewhat less than those registered in summer, the daytime highs are warmer, since the sky is almost always cloudless. Especially after a wet, cloudy summer, fall and winter's sunny days cause a spurt of plant growth and heightened insect activity.

SPECIFIC NAME. From the Latin noun fulgor, "glitter" or "brilliance".

2. Carinodes vargasii Porter, NEW SPECIES
(Fig. 2)

FEMALE. Color: antenna dark brown above but paler and more brownish yellow below, flagellomere 12 more or less whitish above; head with much of front, vertex, occiput, postocciput, and temples shiny black; orbit broadly white on face, continuing white a little more narrowly dorsal onto vertex, where there is a short break opposite hind ocellus, and then extending more and more broadly ventrad onto hind orbit and finally spreading over most of lower 1/5 of temple; brownish yellow on antennal sockets and narrowly between them; face mesad of orbits dark brown with tan staining, except for a very large dorso-median white blotch below and between antennal sockets; clypeus brownish yellow, contrastingly paler on apical 1/3; malar space narrowly pale brown; mandibular condyle faintly brown; mandible white on basal 1/3, medially pallid brown, and nearly black on teeth; palpi white with faint brown staining; thorax shiny black with white markings as follows: on pronotal collar, humeral margin of pronotum, axillary sclerites, dully on prescutellar ridge, rather dully and irregularly on apical 1/5 and rearward on sides of scutellum, dully and suffused with pale brown on hind rims of meso- and metanotal axillary troughs, a little dully on subalarum and irregularly on much of dorsal 1/2 of prepectus, dully on dorsum of mesepimeron, dull on much of dorsal metapleuron, and dully on lower hind corner of mesopleuron, as well as with tan to brown staining on much of propleuron, on prepectus around mid-height, ventrad on mesepisternum, throughout on mesosternum, on most of mesepimeron, dully on tegula, on much of subtegular area, irregularly on scutellum bordering its white markings anteriad and interiad, dully on postscutellum, dully on lower 1/3 of upper metapleuron, and extensively on lower metapleuron where it is dull mesad and dorsad and paler and more brownish yellow ventrad and apicad; propodeal dorsum shiny black with some brown staining especially in area-basalis and arcoala and, more brightly, anteriad of spiracle in 1st pleural area and, again, toward apex of 2nd pleural area; hind face of propodeum uniformly pale brownish yellow; gastric tergites deep shiny brownish yellow with dusky on most of apical 1/3 of petiole and all but apical 1/5 and narrow sides of postpetiole, as well as with tergites 6 and following a little paler; fore and mid legs more or less brownish yellow with obscure white staining on coxae, apical rims of trochanters and trochantelli, spicis of femora, whitish staining on coxae, apical rims of trochanters and trochantelli, spicis of femora, and on bases of tibiae; and hind legs more deeply yellowish brown with only faint traces of whitish staining and extensively but irregularly blackish brown above on coxa (except for a meso-interior pale brown blotch), trochanter, and femur, as well as with much dusky on tibia; wings hyaline, slightly brown-tinged, the stigma pale brown.

Length of fore wing: 4.4 mm. Flagellum: 1.7 as long as deep at apex; flagellum with 28 segments. Head: temple in dorsal view weakly convex and
strongly receding behind eye, in lateral view at mid-height 0.57 as long as eye and laterally with numerous moderately large but rather shallow subadjacent to somewhat more widely separated punctures; ocellocular line 0.95 as long as diameter of hind ocellus; occiput steeply sloping between hind ocelli and occipital carina; dorsal 1/2 of frons with abundant, rather large, strong, uniformly quite dense punctures; malar space 0.62 as long as basal width of mandible; clypeus gently convex, practically impunctate on apical 1/2, except along margin, and with apical margin unmodified, sharp, and almost straight. Pronotum: behind epomia mostly smooth, polished, and delicately punctured, with some strong wrinkling only along hind margin; humeral margin well differentiated and gently convex along mesoscutum. Mesoscutum: smooth and polished with very numerous, uniformly distributed, mostly subadjacent, medium-sized punctures. Scutellum: flat, weakly tapered rearward. Mesopleuron: lower hind quadrant with abundant moderately small punctures and some fine intercalated wrinkling; subalarum moderately inflated. Metapleuron: lower division with abundant almost uniformly subadjacent to adjacent, strong, medium-sized punctures and quite fine, intercalated, longitudinally biased to reticulate wrinkling. Propodeum: spiracle 2.1 as long as wide; pleural carina percurrent; area-basalis 1.4 as broad basally as long; areola with a weak median longitudinal carina and otherwise mostly smooth and shining; 1st lateral area shining with abundant, almost uniformly subadjacent, moderately large and strong punctures, 1.0 as wide as long externally; 2nd lateral area with almost uniformly distributed, moderately large and strong punctures plus some wrinkling that is strongest peripherally; crista broad but very low subcuneate, its outer angle only slightly projecting and not sharp; hind face of propodeum with strong reticulate to trans-biased wrinkling, without a median longitudinal carina, but with the latero-median longitudinal carinae percurrent, so as to define an elongate, parallel-sided petiolar area that is 1.7 as long as the areola. First gastric tergite: postpetiole and apex of petiole smooth and shining, impunctate toward apex, but otherwise with almost uniformly distributed subadjacent to adjacent, sharp, medium-sized punctures; dorsal carinae fade out near apex of petiole, so that postpetiole is almost evenly convex and without a differentiated median field; postpetiole 2.2 as wide apically as long from spiracle to apex. Second gastric tergite: smooth and shining with abundant, moderately small, well defined, almost uniformly subadjacent punctures that become palpably sparser only far laterad; gastrocoeli obsolete, without rugae, smooth and polished, elongate, their thyroidia ovoid, about 2.0 as wide as long, 0.3 as wide as distance between them, and 1.0 their width removed from base of tergite; without a band of longitudinal striae between gastrocoeli. Scopa: reaching 0.4 the length of hind coxa. Wing venation: 2nd abscissa of radius 0.55 as long as 1st intercubitus.

MALE. Color: scape brown above and pale brownish white laterally and below; pedicel brown, paler below and on apex; flagellum dark brown above and pale brown below; palpi obscurely brownish white; mandible white on most of basal 1/2, pale brown on much of apical 1/2, and grading into blackish on teeth; clypeus white with a faint and irregular brownish suffusion; malar space white with a faint brownish band between eye and base of mandible; mandibular condyle pale brown; face white with a ventrally widened, almost percurrent, vertical brown streak on each side of the
swollen central field, and a little brownish along dorsal margin of clypeus, especially at anterior tentorial pit; antennal scrobes and area between them largely white with some brown staining; frontal, vertical, occipital, and temporal orbits broadly and continuously white, the white becoming increasingly broader ventrad on temporal orbits until it occupies almost all of lower 1/3 of temple; front, vertex, and occiput broadly shiny black between white orbital bands; postocciput shiny black, except for a little white below near juncture of occipital and hypostomal carinæ; propleuron black with some brownish based; pronotum shiny black with white on entire area anteriad of epomia and contiguously on broad humeral margin and only slightly narrower ventral margin as well as with diffuse brownish staining in scrobe before epomia, along white humeral and ventral margins, and toward lower hind corner; mesoscutum shiny black with a pair of broad, anteriorly narrowed, slightly brown-margined submedian white stripes on about central 1/2 as well as mostly white on prescutellar ridge; tegula white with brownish apico-exterior; axillary sclerites white; scutellum and axillary sclerites white; scutellum and postscutellum white; hind margins of meso- and metanotal axillary troughs somewhat dully white, the troughs themselves black; mesepisternum shiny black with white on speculum, subalarum, and almost all of prepectus with slight brown staining bordering the white areas and a moderately large brown blotch ventro anteriorly just behind propsectal carina; mesepimeron dull brownish white, becoming pure white on upper 1/4; dorsal metapleuron white with brownish peripherally, especially rearward; lower metapleuron white with diffuse, somewhat irregular pale brown staining that becomes more conspicuous anteriad with shiny black on most of its antero-dorsal 1/3; mesosternum white with brownish in median groove and a pair of broad, almost percurrent sublateral yellowish brown blotches; propodeum white with diffuse and irregular pale brown staining, especially in areola and in pleural area for some distance rearward of spiracle with black almost throughout in 1st and 2nd lateral areas; 1st gastric tergite yellowish brown with black on much of apical 1/2 of petiole and basal 1/3 of postpetiole with a broad white apical band on postpetiole; succeeding tergites shiny yellowish brown with lateral margins of 2-4 rather broadly dull white; fore coxa dull white with faint pale brown staining and a dark brown blotch dorsally; fore trochanter white with some irregular brownish staining, especially above; fore trochantellus whitish; fore femur shiny yellowish brown with whitish irregularly on apical 1/10; and fore tibia and tarsus a little more dully yellowish brown; mid leg similar to fore leg except with coxa extensively pale yellowish brown (especially below); and hind leg with coxa shiny yellowish brown with a large posterio-dorsal white blotch on apical 3/5; trochanter, trochantellus, and femur shiny yellowish brown; and tibia and tarsus duller brownish with a dusky tint; wings hyaline, stigma pale brown.

Length of fore wing: 5.0 mm. Flagellum: 1st segment 2.8 as long as deep at apex; flagellum with 32 segments; segments 7 and following definitely nodose and mostly with distinct, broad transverse bands of bristles on ventral side, 7-19 with small, inconspicuous, elongately ovoid tyloides. Head: temple in lateral view at mid-height 0.65 as long as eye and laterally with numerous, moderately large, shallow and obscure, mostly subadjacent punctures; ocelloocular line 1.0 as long as diameter of hind ocellus; malar space
0.50 as long as basal width of mandible. Mesoscutum: a little less densely punctate than in female, punctures averaging somewhat sparser than subadjacent over a broad area latero-posteriad. Propodeum: area-basalis 2.0 as broad basally as long; 1st and 2nd lateral areas with punctures somewhat larger and coarser than in female. First gastric tergite: apex of petiole and postpetiole with numerous large, sharp, punctures that average mostly sparser than subadjacent and become widely spaced on apical 1/2 of postpetiole; postpetiole 1.6 as wide apically as long from spiracle to apex. Second gastric tergite: with uniformly distributed, large, strong punctures adjacent to briefly subadjacent punctures.


RELATIONSHIPS. This is a small, Barichneumon-like species unusual among all Joppini because of its short, ovoid propodeal spiracles. It differs strongly in color, structure, and habitat from *C. fulgor*, the only other north Chilean *Carinodes*.

FIELD NOTES. *Carinodes vargasi* is known only from the lowland Azapa Valley. The unique type series entered a Malaise trap placed across a minor irrigation ditch beside an olive grove. The fertile Azapa Valley, with its copious underground fresh water, for many decades has been densely planted with crops, such as olives, corn, tomatoes, bananas, and peas. Concurrently, there has been massive application of pesticides and herbicides. Chemical pollution and removal of the native flora thus may explain the apparent rarity of *C. vargasi*.

PHENOLOGY. Since my Azapa Malaise trap operated from July 1976 to June 1977 but collected *C. vargasi* only in January, the species appears to be an aestival form adapted to coastal Tarapacá's maritime subtropical summer. January temperatures at the type locality show average maxima of 27-29° C and minima of 16-20° C. There is no measurable rain, but proximity to the ocean assures substantial relative humidity, which averages between 69 and 71%. This *Carinodes* thus agrees in annual phanology with many other north Chilean coastal Hymenoptera, which also become most abundant in the summer and diminish or disappear during winter (in diametric contrast to most of their highland relatives).

SPECIFIC NAME. For Ingeniero Agrónomo Héctor Vargas C. of the Universidad del Norte, in recognition of his generous assistance during my field work in Tarapacá.

GENUS *Thymebatis* BRÉTHES

*Thymebatis* belongs to the Subtribe Amblytelina (Heinrich 1977: 88), and therein may be related to the nearly cosmopolitan but predominantly Holarctic genus *Eutanycura* Cameron. The edentate mandible, obsolete or absent thyridia, and densely setose ventro-interior margin of the male clasper separate *Thymebatis* from all other Latin American amblyteline genera.

This genus has many score species concentrated in Andean, Neantarctic, and subtropical South America. It is found from 4000 m to sea level but generally inhabits regions cooler, higher, and more arid than those preferred
by other joppines, although some Thymebatis have invaded the subtropical wet forests of north Argentina and southeast Brasil.

**KEY TO THE TARAPACA SPECIES OF Thymebatis**  
(Female of T. hypsigna unknown)

1. Scutellum white; gaster black with white apical bands on tergites 2-7; wings faintly brownish; postpetiole 2.2 as wide at apex as long from spiracle to apex, its surface with almost uniform fine longitudinal wrinkling; 2nd gastric tergite mat throughout and with delicate reticulate wrinkling, superimposed fine longitudinal striation and numerous medium-sized shallow punctures; male subgenital plate 0.5 as long as wide, its apical margin with a short, subligulate projection on median 1/3 .................................................. 1. Thymebatis hypsigna n. sp.

1'. Scutellum black; gaster red; wings blackish; postpetiole 1.5-1.6 as wide apically as long from spiracle to apex, its surface smooth and shining; 2nd gastric tergite smooth and polished with numerous, variably dense, moderately small punctures; male subgenital plate 1.3 as long as wide, its apical margin produced over median 1/2 into a broad but elongately subligulate or bluntly triangular process .................................................. 2. Thymebatis hickinsi n. sp.

1. **Thymebatis hypsigna** Porter, NEW SPECIES  
(Fig. 4, 7)

**FEMALE.** Unknown.

**MALE. Color:** scape shiny black (rest of antenna missing); head and mesosoma shiny black with white on most of scutellum and postscutellum with brownish on palpi, about subapical 1/3 of mandible, mandibular condyle, tegula apico-externad, and on axillary sclerites; gaster shiny black with broad white apical bands on tergites 2-6, white on more than apical 1/2 of tergite 7, and a large, brownish-tinged white blotch on apex of clasper with some brownish on sternites, particularly on their narrow apical rims and more generally on sternites 2 and 3; fore and mid legs with coxa shiny black, trochanter shiny black with apical rim obscurely brownish black, trochantellus black grading into tan on apical 1/2 or less, femur and tibia yellowish brown, and tarsus dull brownish to tan with much dusky staining; hind leg similar to preceding but with a moderately large black area dorsally on apex of femur, and tibia with a dusky tinge on apical 1/10 (last 3 tarsomeres missing); wings hyaline with a faint brownish tint, stigma dark brown.

**Length of fore wing:** 7.1 mm. **Head:** face with median field strongly raised and throughout with dense punctures and puncto-reticulation but, especially on median field, with some brief smooth interspaces between punctures, as well as with very long, moderately dense, whitish setae; temple in lateral view at mid-height 1.2 as long as eye and with numerous large to very large coarse punctures that are mostly sparser than subadjacent and well separated by conspicuous smooth interspaces; ocellocular line 1.2 as long as diameter of hind ocellus; malar space 0.75 as long as basal width of mandible. **Mesoscutum:** notaulli traceable but not strong for about 1/3 length...
of mesoscutum; surface with large, strong, mostly subadjacent to adjacent punctures that become irregularly a little sparser on apical 1/2. Scutellum: dorsally almost flat. Mesopleuron: on dorsal 1/2 between prepectal carina and speculum with large, coarse, adjacent to reticulately confluent punctures and much longitudinally biased wrinkling. Propodeum: very coarsely wrinkled and puncto-reticulate; with unusually long, moderately dense, whitish setae; lateral longitudinal carinae and costula absent; area-basalis obliterated; areola sharply defined, transversely rectangular, 1.4 as wide as long; apical trans-carina very irregularly defined laterad of areola. First gastric tergite: dorso-lateral carina sharp throughout; dorsal carinae prominently traceable almost throughout but not sharp; median field well defined on apex of petiole and on postpetiole; postpetiole shining with a few, mostly widely scattered, large, shallow punctures and almost uniformly with fine longitudinal wrinkling, 2.2 as wide at apex as long from spiracle to apex. Second gastric tergite: mat with delicate reticulate wrinkling on which is superimposed fine longitudinal striation and among which are numerous, medium-sized, shallow, subadjacent to moderately sparser punctures; gastrocoeli faintly impressed but with conspicuous rugae. Subgenital plate: very broad, 0.5 as long as wide, its apical margin gently produced (at about a 20° angle) but with a short, broad, obtusely subligulate projection on median 1/8.


RELATIONSHIPS. Thymebatis hypsista is not closely related to its only north Chilean congener, T. hichinsi n. sp. It differs from T. kichinsi by the features given in the key and also in its better differentiated facial median field, longer ocellocular line, pulpably developed notauii, more coarsely punctate mesoscutum, more coarsely punctate and wrinkled mesopleuron, and broader, shorter areola.

FIELD NOTES. This species exists under the same environmental conditions already described for the sympatric Carinodes fulgor. The holotype was collected in a Malaise trap at 3000 m near Socoroma in northern Tarapacá. The trap spanned an irrigation ditch, that flowed from east to west just above an oregano field and which was bordered by tall bunch grass, roses, Eucalyptus, and other native and introduced vegetation.

SPECIFIC NAME. From the Greek superlative adjective hypsistos (a), “highest,” in reference to the lofty habitat of this species.

2. Thymebatis kichinsi Porter, NEW SPECIES
(Fig. 5, 6)

FEMALE. Color; antenna black, scape sometimes more or less dull reddish brown below toward base, flagellomeres 5 or 6-7 (sometimes only 7) with white areas above, 8-12 largely white with variably extensive blackish areas below, and 13-14 more broadly blackish with white restricted mostly to dorsum; head and mesosoma shiny black with weak brownish staining on palpi, and more intense brown or dusky brown staining on subapical 1/4-1/3 of mandible and on mandibular condyle; gaster shiny red, sometimes irregularly dusky; fore leg with coxa, trochanter, and trochantellus black with a little whitish posteriorly on apical rim of trochanter and trochantellus
Porter: Joppini of Tarapaca

becoming red on apex (sometimes with dull red on much of coxa and trochanter also), femur shiny red with slight to considerable blackish staining ventro-posteriorly on apical 1/4 or less and a slight dusky tinge on base, tibia brownish black grading into red on basal 1/3 or less ventro-posteriorly and more narrowly elsewhere and with a broad, percurrent, anterio-ventral dull white area; and tarsus blackish with apex and venter of segments more brownish or sometimes more generally tinged with reddish brown; mid leg with coxa shiny black grading extensively into dull red below or sometimes almost wholly red; trochanter shiny black with white narrowly on apical rim posteriorly or sometimes mostly red with blackish only toward apex, trochantellus mostly dull to bright red with some dusky staining basad, femur shiny red with faint dusky staining at base and more or less blackish narrowly on apex above, tibia brownish black with dull red below on basal 1/3 or less anteriorly and on more or less of basal 2/3 posterio-ventrally as well as again more obscurely on apex anterio-ventrally; hind leg with coxa shiny red except for black narrowly on base above and sometimes even more narrowly on dorso-apical rim, trochanter and trochantellus red and sometimes with black on base of trochanter and more diffusely toward apex of trochanter and diffusely on trochantellus, femur bright red with a little, variably developed blackish staining on base and apex, tibia dull reddish on much of basal 2/5-1/2 above and basal 3/4 below, and tarsus black; wings rather strongly blackish with metallic reflections, stigma black.

Length of fore wing: 8.5-10.5 mm. Flagellum: long, slender, bristle-shaped, a little ventrally flat-tipped beyond middle, with 42-43 segments, 1st segment 2.8-3.4 as long as deep at apex. Head: face with median field low and weakly differentiated and throughout with strong puncto-reticulation or at least dense, subadjacent to adjacent punctures, with moderately long, dense, brown setae; temple in lateral view at mid-height 1.0 as long as eye; uniformly with abundant medium-sized to large, subadjacent to a little sparser punctures that are separated at most by rather brief shiny interspaces, or sometimes with punctures mostly sparser than subadjacent; ocellular line 1.0 as long as diameter of hind ocellus; malar space 0.70-0.74 as long as basal width of mandible. Mesoscutum: notauli not distinctly impressed; surface polished with abundant, medium-sized, sharp mostly sub-adjacent or a little sparser to adjacent punctures, which become somewhat sparser rearward, particularly on a rather ample median band. Scutellum: gently convex. Mesopleuron: on dorsal 1/2 between speculum and prepectal carina with abundant to occasionally sparse, moderately large, sharp punctures which on apical 1/2 usually are mingled with rather fine longitudinally biased wrinkling but anteriad are sparser and separated by prominent polished interspaces. Propodeum: strongly to coarsely reticulate and reticulo-rectangular with abundant, moderately long brownish setae; lateral longitudinal carinae more or less strongly defined or sometimes only well developed basad above spiracle; area-basalis short and broad, well defined, 3.6-4.5 as wide as long; areola more or less well defined, square to elongately rectangular, 1.0-1.3 as long as wide; apical trans-carinae continuing more or less sharp laterad of areola. First gastric tergite: dorso-lateral and dorsal carinae weak to absent; median field at most weakly suggested on postpetiole and base of petiole; postpetiole silky-shining to highly polished, in some specimens with faint, delicate longitudinal striae and obscure micro-
reticulation, and with some, medium-sized to rather large, shallow, scattered punctures that become considerable denser laterad, 1.7-2.1 as wide apically as long from spiracle to apex. Second gastric tergite: silky-shining to highly polished with delicate to evanescent micro-reticulation and abundant, shallow, small to medium-sized, mostly at least a little sparser than subadjacent punctures; gastrocoeluli rather large but weakly impressed, their rugae varying from strong to obsolete, the thyridia scarcely differentiated.

MALE. Differs from female as follows: Color: flagellum with white above only and, in part, irregularly on segments 10 or 11-18; front femur shiny black grading above into dull red or sometimes largely reddish and with a dull white area on apical 1/4 anteriorly; front tibia as in female but with only a little reddish staining near base and with some pale brownish above on apical 1/6; mid tibia black with red only briefly near base; hind tibia black with dull reddish only on about basal 1/4.

Length of fore wing: 9.0-10.6 mm. Flagellum: a little shorter and more strongly bristle-shaped than in female, with 42-44 segments, segments not nodose and without ventral transverse bristle ridges, with elliptic to elongate-oval tyloides on segments 6 or 7-22 or 24. Head: temple with punctures sometimes a little larger and denser than in female, 1.0-1.1 as long as eye in lateral view at mid-height; malar space 0.54-0.67 as long as basal width of mandible. First gastric tergite: dorso-lateral and dorsal carinae obsolete to absent; median field scarcely suggested on apex of petiole and on postpetiole; postpetiole without striae and with mostly very sparse medium-sized punctures, 1.5-1.6 as wide apically as long from spiracle to apex. Second gastric tergite: smooth and polished with numerous moderately small punctures that in some specimens are largely subadjacent but in others tend to be considerably sparser. Subgenital plate: 1.3 as long as wide, moderately broad, its apical margin produced over median 1/2 into a wide but long subulate or bluntly triangular process.


RELATIONSHIPS. In T. hichinsi the postpetiole is smooth or, at most, shows faint longitudinal wrinkling, whereas many Thymebatis (such as the parapatric T. hypsista) have the median postpetiolar field longitudinally wrinkled, as is commonplace among related genera of the subtribe Amblytelina. This species' red gaster, black head and mesosoma, dark wings, and black and white antennae also constitute a color pattern rare for Thymebatis,
but one not uncommon among other large ichneumonids of the Coastal Desert and west Andean slopes, such as the mesostenines *Trachysphyrus patenensis* (Cockerell), *T. violaceipennis* (Cameron), *T. diplatys* Porter, and *T. weyrauchii* Porter.

FIELD NOTES. *Thymbelatis hichinsi* may be swept from corn, alfalfa, and willow, but has not been collected in Malaise traps. I have found it sporadically in alfalfa but most often on corn. Corn in Tarapacá suffers heavy aphid attack, and the plants often become covered with honeydew. The honeydew attracts numerous *T. hichinsi*, along with a host of aculeate Hymenoptera (*Polistes weyrauchorum* Willink, *Pachodynerus peruensis* Saussure, *Hypodynerus andeus* Saussure, *Anoplitus* sp., *Pommitus dichromorphus* Rohwer, *Prionyx* sp., *Trichostictia brunneri* Parker, *Podagritis* sp., *Liria* sp., and *Ochleroptera* sp.).

This species ranges from sea level to 2700 m. It is most common at lower elevations, and I have taken long series at Timar (1850 m) in the Prepuña as well as below 1000 m in the Lluta, Azapa, and Camiña Valleys. Populations of *T. hichinsi* from high altitudes must be quite different physiologically from those which inhabit low regions. Below 1000 m, the climate of Tarapacá is rainless and frost-free with a January temperature range of 16-27°C and a 10-18°C range in July. Above 2000 m, in contrast, at least 100 mm of rain fall yearly; although there still is considerable winter frost, daytime maximum temperatures, even in winter, normally reach at least 18-20°C since these loftier regions are unaffected by the cool sea breeze off the Humboldt Current. Fertile valleys between 1 and 2000 m show yet another style of climate. They are almost rainless, like the coastal valleys, but, situated beyond the reach of maritime cooling, mark year-round high temperatures of 25-40°C and yet are high enough to suffer occasional winter frost. Such wide environmental tolerance characterizes numerous Tarapacá Hymenoptera besides *Thymbelatis hichinsi*. For example, the anthophorid, *Xylocopa viridigaster* Lepeletier, is found from 3370 m to sea level, as are the ichneumonids, *Pachodynerus peruensis* Saussure and *Hypodynerus andeus* Saussure.

PHAEONOLOGY. *Thymbelatis hichinsi* has been collected most often in July, the coolest winter month, but there are also records for April, May, August, and November. This phaenologic pattern agrees with that of most tropical and subtropical ichneumonids, which peak during the fall, winter, or spring (Porter 1977) but is only tentatively documented, since the Tarapacá Ichneumonidae have been sampled thoroughly only during winter.

HOST RECORDS. *Thymbelatis hichinsi* has been reared several times from *Copitarsia consueta* Walker (Lepidoptera: Noctuidae), a serious alfalfa cutworm in the coastal valleys of Tarapacá.

SPECIFIC NAME. For Técnico Agrícola Nelson Hichins O., of the Universidad del Norte, in recognition of his vast contributions to our knowledge of the Chilean insect fauna.

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**LITERATURE CITED**


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A NEW THYREODON BRULÉ (HYMENOPTERA: ICHNEUMONIDAE) FROM SOUTH TEXAS

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**ABSTRACT**

*Thyreodon rivinae* n. sp. was collected during July 1979 from undergrowth of *Rivina humilis* Linnaeus in *Celtis* woods at Bentsen Rio Grande Valley State Park near Mission, TX. The salient diagnostic features of *T. rivinae* are its enlarged ocelli (which almost touch the compound eyes laterally), yellow flagellum, and black fore wing with a large hyaline blotch in the discocubital and 2nd discoidal cells.

Recently, I confirmed the presence in southernmost Texas of *Thyreodon laticinctus* Cresson and *T. niger* Cresson, Neotropic species previously unrecorded north of México (Porter 1976: 304-9). Further collecting now has revealed that an undescribed *Thyreodon* inhabits the same area. Herewith I describe this new species and offer a revised key to the Texas *Thyreodon*.

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