

Studies in the Orthoptera of Turkey, Iraq and Syria

BY

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Introduction.

The present paper is an outcome of two brief visits to the Middle East which I had an opportunity to make recently. Both of them had as their aim ecological investigations on the Moroccan locust (*Dociostraurus maroccanus* Thunbg.) and on both occasions very little time could be spared for general collecting. Nevertheless, the results proved to be of considerable interest in several directions. First of all, the proportion of new subspecies, species and even genera amongst the material collected proved to be much higher than one would have expected. More important, however, is the fact that my work on the material made it necessary thoroughly to revise several genera and groups of species, and to study in detail and to redescribe certain insufficiently known species. Apart from these results of interest to systematists, my voyages enabled me to make first-hand, if necessarily cursory, observations on the geographical distribution and the ecology of Orthoptera. These observations presented a special attraction to me, since I hoped to be able to link them up with my former studies in the Caucasus. In this I was not mistaken, and a personal acquaintance with the fauna of Asia Minor permitted me much better to understand the composition of the Caucasian fauna and to introduce some important corrections into the faunistic picture of Caucasus and of Asia Minor which I presented some twelve years ago (*Proc. Zool. Soc.*, London, 1921).

It is my pleasant duty to record here my sincere gratitude to the many friends and colleagues who helped me in various ways either during my travels, or when I have been working on the collection. Most of all I am grateful to my friend Sureya Bey Effendi, state councillor at Ankara, a great lover of nature who does not spare efforts to

advance researches in the flora and fauna of his country. It was due to him that the Government of the Turkish Republic invited me in 1931 to study the problem of the Moroccan locust in Western Anatolia. In 1932 again it was due to his keen perception of the value of scientific investigations, that an invitation to visit the Iraq-Syrian area of the Moroccan locust was sent to me by the International Locust Office at Damascus, of which Sureya Bey is the elected President. While in Turkey in 1931, it was entirely due to his kind attention that I have been able to undertake several small collecting expeditions from Ankara, with most interesting results.

During my travels in Western Anatolia, I found a helpful companion in Nihat Shevket Bey, Director of the Plant Protection Station for that region, and I am grateful to him and his colleagues at Burnova who extended to me their friendly hospitality. Of other Turkish officials who have all been most willing to assist me not only in my official work but in the collecting, as well, I should particularly like to mention Haidar Bey and Fuat Bey, agricultural officers at Demirchi and Tireh, respectively, who are both greatly interested in the local fauna.

While in Iraq in 1932, I was extremely grateful to Mr. F. Webster, Inspector-General of Agriculture for the excellent arrangements which enabled me to cover a very large area within the short time at my disposal; and to Mahommed Al Radi, Chief Locust Officer who accompanied me in my travels. Similar assistance in Syria was rendered by Mr. S. Hassibi, Director of the International Locust Office at Damascus and I am pleased to express my gratitude to him.

Work on the collection necessitated asking for advice, for sending of types etc., from several colleagues. I am grateful for the assistance rendered in this direction by Dr. Willy Ramme (Berlin), Dr. L. Chopard (Paris), Dr. Max Beier (Vienna), Dr. I. Bolívar and Dr. C. Bolívar (Madrid).

Collecting in Turkey in 1931.

I arrived at Ankara (former Angora) on the 12th of June. The steppe vegetation of the Anatolian plateau was at its best, fresh and green, with numberless flowers of the late spring. Little time was

available for excursions in the immediate neighbourhood of the town, but this did not disconcert me greatly, since I thought, it was too early to expect finding many adult Orthoptera. I was, however, not quite correct in my estimation of the season, since certain species of *Acrididae* proved to be already adult, and I was greatly pleased to find such old friends as *Ramburiella turcomana* and *Pyrgodera armata*, which I collected many years ago in the Caspian steppes and in Transcaucasia. Still more interesting, however, it was to capture the first individuals of two true local species, *Tmethis heldreichi escherichi* and *Dasyhippus escaleraei*. The latter species was fairly common, but I made a mistake of not collecting a good series of it, hoping to be able to explore the local fauna more thoroughly a few weeks later, after completing my survey of the Moroccan locust in Western Anatolia. *D. escaleraei*, however, proved to be an early summer species, and they all disappeared when I returned to Ankara in August.

After a couple of days at Ankara, I travelled by railway to Smyrna (now Izmir) and established my headquarters in the Agricultural School at Burnova (former Burnabad), a few miles to the east of Smyrna. Collecting round Burnova has been carried out at intervals between trips to the different districts of Western Anatolia for locust survey. Burnova itself is a congregation of villas and small houses, scattered amongst extensive vineyards and olive groves covering the vast alluvial plain west of Smyrna. The Agricultural School occupies several large villas (abandoned by Greeks) and in one of them is housed the West Anatolian Institute for Plant Protection. No profitable collecting could be expected in the cultivated plain, but twenty minutes' walk was sufficient to reach the low hills at its northern edge. Their slopes bear a typical Mediterranean vegetation, which at the middle of June had already a full late summer aspect. All grass and annual plants were parched and almost devoid of any insect life. Particularly striking was a complete absence of any *Acrididae*, even of the commonest ones, like *Calliptamus*. Evidently, they were already over, and the only members of the family found by me were a few *Oedipoda coerulescens*, as well as a species of *Pezotettix* which I thought at the time to be *P. platycerca*, but which proved to be new. This *Pezotettix anatolica* occurred commonly in the dwarf scrub of very prickly oaks, dotting the hill slopes. Species of *Tettigoniidae* were

more numerous, but of little interest, *Tylopsis liliifolia* and *Phaneroptera quadripunctata* being most conspicuous, while the graceful *Acrometopa servillea* was found only in few examples. Of the wingless *Phaneropterinae*, *Poecilimon* and *Isophya*, not a single specimen was found, since it was obviously much too late for them. Of the *Decticinae* also only *Bucephaloptera bucephala* was found and one green *Pholidoptera* seen, but not captured. *Bucephaloptera* was very abundant in oak scrub, but extremely difficult to catch. They come out towards sunset and can be seen in numbers sitting on prickly oak bushes, but at the slightest disturbance they dive inside the bush and are lost. Of Mantids only *Rivetina baetica caucasica* was found, and crickets were represented by *Gryllus burdigalensis* and *Oecanthus pellucens* coming to lights at night. On the whole, collecting at Burnova was very disappointing and the experience showed that a much earlier season should be chosen in this typical Mediterranean locality.

A trip from Burnova to Urla (Vurla) on the southern shore of the Gulf of Smyrna gave me an opportunity to take a sample of the fauna of the littoral plain. In grassy meadows near the sea-shore the most abundant species was *Chorthippus parallelus tenuis*, a handsome large subspecies of the common European *Ch. parallelus*. A few *Metrioptera affinis* were also found, as well as a *Saga* sp., similar to *serrata*. On bare salty soil *Sphingonotus mecheriae* was caught by my companion Nihat Shevket Bey.

A few days later a trip to the north of Smyrna was undertaken, to the village Ali-Agha, on the sea shore some miles north of Mene-men. The hills here come quite near the sea, and the grass on their slopes was less parched than elsewhere. Here some *Calliptamus italicus* were found, together with *Ameles heldreichi*, *Metrioptera vittata* and *Bucephaloptera bucephala*. A single female of a brachypterous *Metrioptera* proved to belong to a new species, *M. brevipes*, but I tried in vain to find more.

My next trip was to Tireh and from there to Ephesus, Skalanova and to the Buyuk-Menderes valley. Only a short excursion was made in the environs of Tireh, on the northern slopes of the high mountains rising immediately beyond the town. The vegetation here was fresh, the slopes being covered with considerable trees. The time

at my disposal, however, was too short and only few common species were obtained. Here, however, some species belonging to the highland fauna already make their appearance, such as *Rhacocleis turcicus*, *Chorthippus vagans* and *Notostaurus anatolicus*. There is no doubt that Tireh would be a convenient centre for collecting, since the environs present a considerable variety of conditions, owing to the very steeply rising mountains facing north.

The necessity of investigating locust breeding grounds in the mountains south of Tireh provided an opportunity of doing some collecting on the way and near the small village Habiblar. No roads are possible in these mountains, so that we had to leave our car behind and to walk on foot the best part of a day. Unfortunately, the hill-sides were even more parched and lifeless than those near Smyrna, and the day would have been wasted from the collector's point of view, were it not for a small spring in a ravine. The spring was shaded by some trees and the water overflowing from it formed a small pool, about a yard across. On the sandy shores of the pool, some *Paratettix meridionalis* were present, as well as numerous *Tri-dactylus*. These latter provided me with a quarter of an hour of interesting sport, as I was anxious to collect a good number, suspecting the possibility of their belonging to more than one species. This suspicion proved to be correct, there being two species, the common *T. variegatus*, and an extremely interesting new one, *T. irremipes*.

The village Habiblar lies at an altitude where pines make their appearance, but my afternoon excursion on these limestone rocks, overgrown with *Cistus* and similar shrubs, was not rich in results. The only excitement was provided by *Oedipoda aurea*, whose golden yellow wings flashing against limestone glaring white in the sun produced an unforgettable impression. The species was described by me some years ago from Palestine and its occurrence in Western Anatolia was wholly unexpected to me, though earlier authors recorded it from there as a yellow-winged variety of *O. coeruleescens*.

Descending from Habiblar to the road leading from Tireh to Ephesus, we motored along it. The road follows the narrow valley of Kuchuk-Menderes, enclosed between the almost bare rocky slopes of Alaman-Dagh and Salaheddin-Dagh. The valley itself is mostly cultivated and luxuriant vegetation is developed near water. A brief halt

was made for collecting near a shallow lake, of which there are several in the valley teeming with ducks and other water-fowl and adorned with numberless graceful snow-white egrets, making the lakes look like ponds in a zoological garden. Short grass and sedges on the lake shore produced numerous *Chorthippus dorsatus loratus*, *Ch. parallelus tenuis*, as well as *Duroniella fracta*. The latter find was of particular value, since the species was originally described from Ephesus and my specimens can be considered topotypical.

The voyage by car from Ephesus to Skalanova was of little interest, though a *Sphingonotus* (of the *coerulans*-group) was collected on sandy sea-shore. From Skalanova we turned inland, and crossed a high divide into the Buyuk-Menderes (Meander) valley at Sokia. The high hills between Skalanova and Sokia are densely overgrown with the Mediterranean «maquis» consisting of *Cistus* and similar shrubs, and should provide an interesting collecting ground earlier in the year when wingless *Phaneropterinae* can be expected.

From Sokia to Aydin and another hundred kilometers beyond it, to Ortakche, we travelled at a high speed, without stopping, so there is nothing to record. The enormous fertile valley of Buyuk-Menderes represents a vast alluvial plain and its fauna appears to be very poor and devoid of interest, though earlier in the year perhaps better results can be obtained. Return voyage from Ortakche to Smyrna was over the same route and no collecting was done.

At the end of July we went to Goelchik, at an altitude about 4,000 ft. in the Bozdagh mountains. The village is situated in a most picturesque valley, on the shore of a big placid lake, surrounded by wooded hills. In the rank vegetation in the neglected gardens of the village I found some *Poecilimon*, *Leptophyes albovittata*, *Saga* sp. (similar to *serrata*), *Metrioptera affinis*, *M. vittata*, *Chorthippus parallelus tenuis*. An excursion in the hills resulted in very little, though I was fortunate in capturing a single male of *Chorthippus bozdaghi* sp. n., as well as some *Stenobothrus nigromaculatus* and *Oedipoda aurea*.

On the first of August I quitted my temporary headquarters at Burnova going by car to Nif, Kassaba and Salihli, but without any opportunity of collecting on the way. From Salihli we turned north, crossed the broad fertile valley of Gediz-chai and started a steady climb into the hills covered by widely scattered *Vallonia* oaks. Parched

whitish-grey hills and greyish oak-trees with scarcely any vegetation between them combined to make the landscape very desolate. A striking, though very sinister, variety was introduced by pitch-black torrents of solidified lava filling some of the ravines. A breakdown of the car forced me into an attempt to kill the time by collecting. Nothing of any interest could be found, and in despair I decided to have a close look at a lava-field. Soon I was amongst a landscape as weird as can be only imagined. Black rocks piled up in an undescrivable chaos, with pointed pinnacles and acute edges, made the going extremely difficult and at times dangerous. No green plants and no insects were visible in this dead land and the afternoon heat reflected from black lava was most oppressive. Still, there was some peculiar fascination in these surroundings, and I was slowly making my way from rock to rock, when I was startled by a sharp clatter and a flash of blue wings of a grasshopper, rising from a rock and zigzagging to another. There it became at once invisible, but approaching it very cautiously I succeeded in catching a black *Sphingonotus*, densely covered with hairs, and with beautiful blue hind wings. I recognised it as *S. pilosus*, which I never expected to find here, as it was previously known from Persia only. An exciting hunt followed. The grasshoppers were fairly common, but they were exceedingly alert, and the trick they had of suddenly changing the direction of flight made catching them extremely difficult, particularly when one had to balance on sharp rocks where a fall would mean severe bruises and a certain loss of the killing bottle. All attempts to catch *Sphingonotus* sitting on a rock by covering it by net were without success, since the net could never fit the uneven surface, and *Sphingonotus* would fly not upwards into the net, as any other grasshopper would, but escaped through one of the openings. Moreover, it was not easy to see a *Sphingonotus* on the rock and they very often crawled into crevices or sat on a vertical wall of the rock. It was not surprising, therefore, that after half an hour of desperate hunting in the blazing furnace of the lava field I had only a few *Sphingonotus* to show, but I was fully content with the result.

Continuing our journey we reached in the evening the old village of Demirchi, very picturesquely situated on the precipitous banks of r. Demirchi-chai. Local agricultural officer, Haidar Bey, in whose hos-

pitabile house we spent the next few days, proved to be an enthusiastic collector of insects and a glance through his collection was interesting. Demirchi is an excellent place for collecting, since it is situated exactly on a boundary between the Mediterranean region and the steppes of the inner plateau. The vegetation in early August was still fresh, but Orthoptera were already in the adult stage. Though it was impossible for me to spare much time on collecting, the results of two days' work at Demirchi were most gratifying. Particularly good collecting ground was a couple of miles north of the village, on the grassy slopes of rolling hills which constitute the magnificently wide landscape round Demirchi. The plants of the slopes are typical of the steppes, and small clumps of *Rhamnus* and *Rosa* are scattered in their lower zones. Amongst the species found here I should particularly mention the great *Bradyporus macrogaster*. Shrill, penetrating songs of males could be heard in the late afternoon from many clumps of *Rhamnus*, but the singers was not always easy to catch, since they would become silent on approach. However, I succeeded in tracing several males and was even fortunate in catching a female which, like myself, was crawling towards a male singing in a bush. Another interesting species was the graceful *Saga puella*, a male of which was found by Haidar Bey and presented to me, while a female was found sitting on the top of my hat when returning from an excursion devoted mainly to a fruitless search for this species! Amongst other Orthoptera found at Demirchi, an interesting sport was provided by two brachypterous Decticinae, *Rhacocleis turcicus* and *Metrioptera incerta*, which were numerous near a little brook overgrown with *Salix*, *Rosa* and *Rubus*, but exceedingly difficult to catch, escaping at the slightest disturbance into the dense thicket of spiny shrubs. Mediterranean fauna was represented at Demirchi by *Bucephaloptera bucephala*, *Pezotettix anatolica*, *Paracaloptenus caloptenoides*, *Pholidoptera castaneoviridis*, etc., while the species like *Chorthippus vagans*, *Notostaurus anatolicus* and *Oedaleus decorus* were typical of the steppes.

Our route from Demirchi was to the north, across the Simav-Dagh. This is a most picturesque road, through magnificent pine forest on the northern slopes of the mountains, and one over which I never imagined it was possible to travel by car. Apart from wonderful scenery and some exciting adventures in tackling apparently quite

impassable bits of the road, there was nothing to record during the journey from Demirchi to Simav. No collecting at all was done on the rapid travel from Simav to Ushak. From Ushak we went by a little known and exceedingly bad road to Alachehir. Losing the right road and arriving at an impassable ravine, we had to send the car to make a detour, and I used the time to catch some *Sphingonotus* which was fairly common on rocky slopes. This proved to be *S. theodori*, known previously from Palestine and Persia, and its occurrence so far west was of considerable interest. The distance from Ushak to Alachehir proved to be at least twice that which we were told at Ushak and, instead of arriving at Alachehir in the evening, we had to travel by the road unknown to anyone of our party, until we stuck very firmly and hopelessly in a narrow and deep ravine. Best half of the night was passed in digging and piling up stones to enable the car to climb out of the ravine, and only well after midnight we were again moving, reaching Alachehir well after sunrise. After a brief rest, we continued the journey, striking northward again, across the Gediz-chai valley. A halt at dry salt-pans in the middle of the valley was made to see whether there are any interesting Orthoptera, and a *Sphingonotus mecheriae* was the result. Towards the evening the village Kula was reached. Here is one of the centres of the ancient volcanic activity, and extensive lava-fields from a conical volcano begin immediately behind the houses. *Sphingonotus pilosus* was again quite common on lava, and I was able to add to my series. Returning next day to Alachehir, I took a train to Ankara arriving there on the 10th of August.

Since my official task was now completed, I have been able to devote a few days almost exclusively to collecting. In this I was facilitated by the most welcome assistance from the Ministry of Agriculture which enabled me to use motor cars and thus to sample the fauna of several places well distant from Ankara. In the intervals between the long excursions, I was exploring the immediate neighbourhood of the town. My base was the delightful house of Sureya Bey, in Kavakli-Dere, the new garden suburb north of Ankara. It was a pleasant surprise to see that my host, in spite of his very strenuous official duties, could spare some time and a great deal of interest to studying the local fauna in general. His house proved to be

a regular local museum on a small scale, the only one of its kind in the whole Turkey. Apart from collecting himself, Sureya Bey is sufficiently enthusiastic and insistent to induce local agricultural officers and other residents in remote corners of Turkey to collect for him insects and other animals, which he is always most willing to communicate to specialists, his only concern being to advance the study of his native country.

In the second week of August the landscape round Ankara presented a striking contrast with what I saw there only a month ago. Grass was burnt by sun, gone were all the flowers which made the steppe look gay and bright. This was, however, exactly the right season for collecting Orthoptera, except one or two early species which already disappeared, *Dasyhippus escaleraei* being one of them, to my great disappointment.

My excursions on foot were practically all in the low hills and ravines immediately east of Kavakli-Dere. The hills are volcanic, but the outcrops of ancient reddish-brown lava occur only on their tops, the slopes being gravelly and bearing moderately dense steppe vegetation. Amongst the species collected here, mostly in good series, I was particularly pleased to have *Charora pentagrammica*; two local *Sphingonotus*, *S. turcicus* and *S. nebulosus anatolicus*, recently described by myself; then *S. pilosus* found round outcrops of lava, true to its habits; a new subspecies of *Kripa coelesyriensis*; *Oedipoda schochi* and *O. aurea*; *Rhacocleis turcicus*; and a slender *Saga*, probably *capadocica*.

The first long excursion from Ankara was undertaken by me in the pleasant company of Sureya Bey and his wife, in northerly direction. We had only three days at our disposal, but conceived an ambitious and unfortunate idea of reaching Ineboli, on the Black Sea coast, and returning in time. As it happened, we went as far as Kastamuni and decided to return in order to be able to stop on the way for collecting. It was a wise decision, since the best results were obtained on the return journey.

Soon after leaving Ankara rocky hills are crossed by a narrow and picturesque gorge and the road enters the broad valley of Kyzyl-Yrmak. A halt was made about half-way between Kaledzhik and Changri, where the road lies close to the hills bordering the valley

from the west. The lower slopes were covered mainly with *Artemisia*, and I was greatly pleased to find a fair number of the little known *Ramburiella bolivari*. Another, and still better discovery was an *Eremippus*, which later proved to be a new species (*E. gracilis*). Beyond Changri begins an ascent of Kai Dagh, the first of several mountain ridges running parallel to the Black Sea coast and forming the northern rim of the Anatolian plateau. On the slopes, some *Tmethis heldreichi* were collected which belonged to a subspecies distinct from that occurring near Ankara. Higher up, near the top (about 4,000ft.), a small depression by the roadside, with relatively fresh grass, was explored, with good results, and a tiny spring on the northern slope of the pass harboured on its green shores a number of grasshoppers. The presence of *Stenobothrus fischeri* and *St. zubowskyi* and of the interesting new *Chorthippus ilkazi* showed at once that were in another altitudinal zone than at Ankara. At the same time, the presence of such species as *Drymadusa angorensis*, *Paradrymadusa rammei*, *Sphingonotus turcicus*, *S. nebulosus anatolicus*, *S. theodori*, *Tmethis heldreichi inermis*, etc., suggested that the typical faune of the Anatolian plateau ascends at least the southern slope of Kai-Dagh up to its top. The time being already late, we had to hurry on to Kastamuni. Descending into the deep fertile valley of Devrez-Chai, we began a steep ascent on Ilkaz-Dagh, the second and much higher parallel ridge. The landscape was now very different, the road leading up a wide wooded gorge. Pines made soon their appearance and most magnificent views opened at each turn of the road. It was late afternoon when we reached the pass. The road was winding its way through dense pine forest, with high grass, full of flowers, in the open spaces, and I was longing to stop and explore this promising spot, but it was dangerous to lose the time, since we had to face a steep descent to Kastamuni by a road which is not too good even for the day travel. We arrived at Kastamuni late in the evening, and decided not to go any further, but return next day to Ilkaz Dagh for collecting and sleep at a police post near the pass. We hoped that we will be able to start early and to arrive to the pass about midday. It was, however, nearly midday when we started, owing to the delays usual in Turkey, and the sun was already quite low when we reached the pass. The police post is on the northern

side of the pass, and I immediately started climbing up the steep slope above the house. In the grass half-way up fine hairy *Chorthippus ilkazi* sp. n., was common, and I spent some time in securing a good series. On the crest of the ridge, a hollow with short alpine grass was full of *Stenobothrus*, of which three species were taken, *St. fischeri*, *St. lineatus* and *St. nigromaculatus* sbsp., while *Chorthippus ilkazi* was also abundant, and some *Myrmeleotettix maculatus* occurred. The northern slope of the ridge proved to be covered with short alpine grass, studded with beautiful flowers, and the same grasshoppers occurred in numbers, together with *Chorthippus apricarius*. I was kept sufficiently busy by collecting all these Acridids, when a specimen of *Isophya* was found in the grass. Hoping this to be a new species (as it actually turned out to be), I and Sureya Bey concentrated our attention on it, but they were not numerous, and the dusk descended before I had time to admire the wonderful panorama of surrounding mountains. Unfortunately, we had to start for Ankara early next day, and there was no time for collecting in the morning. Any future collector, who happens to travel by this well known road, would be well advised to spend several days at the pass. Of particular interest would be to make an ascent of the highest point of Ilkaz-Dagh (2.350 m.), which is to the east of the pass; at the higher altitudes, some interesting species of *Podisma* and *Nocaracris*, as well as *Aeropus* can be confidently expected.

Return journey to Ankara brought me only a few *Paradrymadusa rammei*, which I found hiding in dwarf bushes of prickly oak on the southern slope of Kai-Dagh.

The next excursion was planned by me in order to obtain an idea of the landscape and the fauna of the innermost part of the Anatolian plateau, which is usually represented as a semi-desert culminating in the salt lake Tuz-Goel. I was seriously persuaded by Sureya Bey and others not to go there, since nothing could be found in this «desert» so late in the season. I thought, however, that the true desert species should be still in the adult stage, and was certain that the fauna may be very poor, but must be extremely interesting. These my expectations were not only fulfilled, but even surpassed.

Leaving Ankara early in the morning of 14th August we crossed

some low hills sheltering the town from the south, and soon entered softly undulating country, intersected by small valleys and ravines, mostly dry except in spring. The prevailing type of vegetation in these dry valleys, with alluvial soil, is that of *Artemisia*, while on the slopes of hills short wiry grasses (*Stipa*, *Festuca*), are developed. The relatively rich *Artemisia* vegetation proved to be almost devoid of any Orthoptera, but hill-slopes provided good collecting. First good finds were made on a rather steep slope, practically devoid of vegetation, where I caught my first specimens of the little *Tmethis holtzi*, hitherto known only from the Cilician Taurus. Immediately after, a small *Sphingonotus* was found, which later proved to be new (will be described by Mr. Mishtchenko). Sureya Bey was lucky in capturing a *Brunnerella mirabilis*, and this find made at once clear to me that this part of Anatolian plateau is under a strong influence of the Iranian fauna, a fact not suspected by me before. Other species collected on hill-slopes during several halts were *Bolivaria brachyptera*, *Dociostaurus hauensteini*, *Ramburiella bolivari*, *Oedipoda schochi*, *Sphingonotus theodori*, *S. turcicus*, *S. nebulosus anatolicus*. In grassy places *Decticus albifrons* and *Acrida turrita turrita* were found.

The flat plateaus between the valleys had a very poor vegetation, mainly of tufty *Stipa* and *Festuca*, with *Thymus* and a few other plants, growing on hard gravelly soil. A cursory examination of such a spot a few kilometres west of the small village Bel-kioi almost led me to the conclusion that this type of habitat is devoid of any Orthoptera at that season; when I noticed what I thought a little Dectid larva hopping into a tuft of grass. I went on my knees to see it better and to my amazement perceived that it was not a larva, but a beautiful miniature replica of a brachypterous *Drymadusa*, most prettily marked with grey and white. In the excitement, I nearly lost this treasure, which exhibited such powers of leaping as I observed only in another tiny Dectid, *Ctenodecticus pupulus*, in Spain. Carefully moving about, with our eyes glued to the ground, and tramping on tufts of grass and *Thymus* to drive out the grasshoppers, we succeeded in collecting some more of them, while a few more were taken at the same place on our way back. I at once recognised the insect as belonging to a new genus, and it is described below under the name *Sureyaella bella* gen. et sp. n. Our hunt for *Sureyaella* resul-

ted in finding together with it a minute brachypterous *Omocestus*, which also was a very distinct new species (*O. nanus*).

The vast plain surrounding the Tuz-goel is an *Artemisia*—steppe, giving way, nearer to the shores, to saltings with their typical vegetation. Orthoptera were practically absent, but I succeeded in catching *Sphingonotus mecheriae*, always connected with salty soils, and a single specimen of a new *Eremippus* (*E. angulatus*) in *Artemisia* at the north-east corner of the lake. The return journey did not bring anything new, but we were able to collect more of the species which I particularly wanted.

Another trip from Ankara was made by me two days later by the road leading to Cheshme-Keupri on the Kyzyl-Yrmak river and a little beyond it. Although the country is somewhat different from that towards Tuz-Goel, I did not find anything of interest, except some *Omocestus nanus*, occurring together with *O. petraeus*. In a grassy meadow in the valley of a small river some *Paracinema tricolor* and *Chorthippus dorsatus loratus* were taken.

On the next day I left Ankara for London, hoping some time in future to return again to the wide steppes of the Anatolian plateau, where there is still so much work for a naturalist.

Collecting in Iraq and Syria in 1932.

My trip to the Middle East in 1932 was again made in connection with my ecological studies on the Moroccan locust. In addition, an opportunity was taken to visit a number of countries in order to collect some information on the Desert locust (*Schistocerca gregaria* Forsk.). An extensive programme was accordingly prepared, and the time for its execution being limited, I had to be content with only very occasional collecting of Orthoptera in a few of the visited places. Indeed, no collecting has been done by me over the most of my route, except a few localities in Iraq and one place in Syria, while some of the most interesting areas were traversed in a motorcar without stopping.

Landing at Jaffa, I was met by my friend Dr. F. Bodenheimer and together with him went to Jerusalem. During my stay there, some

collecting was done only on a trip to the Jordan valley, through the wadi Kelt. Here I had the pleasure of catching some of the local species of Orthoptera, but nothing which would merit a special mention. From Jerusalem I went by road to Damascus, and from Damascus I crossed the Syrian desert to Baghdad, without any opportunity for collecting. A trip from Baghdad to Basra and Kuwait was also without any result.

On the 25th of May I left Baghdad by railway to Khanaqin, near the Persian border, where I arrived early next morning. An excursion to the breeding places of the Moroccan locust was made. The country is typically Iranian, and the Orthoptera found on the low gravelly hills near the Iraqo-Persian frontier were *Eremiaphila turcica*, *Sphingonotus theodori*, *Tmethis gibber angustus*, and the small *Egnatioides farsistanicus*.

My next opportunity for collecting arose two days later. After leaving Sulaimaniah by the road to Penjwin, we climbed the first ridge of the hills, when I noticed some large grasshoppers on thistles growing by the roadside. A stop of five minutes was sufficient to obtain several specimens of the large *Pholidoptera zebra*, described by myself many years ago from Kurdistan. *Dociostaurus hauensteini* was also numerous in the grass in that place. Another stop was made a couple of hours later, in the narrow valley of a small stream along which the road to Penjwin turns northward after leaving the wide valley of the river Tanjero. Here a large *Pholidoptera* was very numerous, some individuals sitting on thistles, others jumping on the ground, and in a short time I obtained a good series. Subsequent study showed this to be an excellent new species, *Ph. iraka*. *Duroniella laticornis* was also found here. On the return voyage from Penjwin to Sulaimaniah, a halt was made near a lake in the Tanjero valley and here, amongst luxuriant meadow vegetation, *Chorthippus dorsatus loratus* and *Conocephalus fuscus turanicus* were abundant.

On the 31st of May low gravelly hills, called Zirga Zarow, bordering the Arbil plain from the south, were visited. The same species as in Khanaqin were found, but *Tmethis gibber* was represented by a blue-winged sbsp. *latus*, and, in addition, a *Tmethis cisti* was caught.

The night of 2nd June was passed at a lonely post Uгла in the

desert between Mosul and Nizibin. A chirping of a cricket attracted my attention and after some vain efforts, I succeeded in catching a male of *Gryllus tartarus obscurior*.

While crossing the northern part of the Syrian desert from Deir-es-Zor to Aleppo, a tyre fortunately burst, and in a small depression with some burnt-up short grass, a few specimens of *Dociostaurus genei* were caught, as well as a *Sphingonotus callosus*.

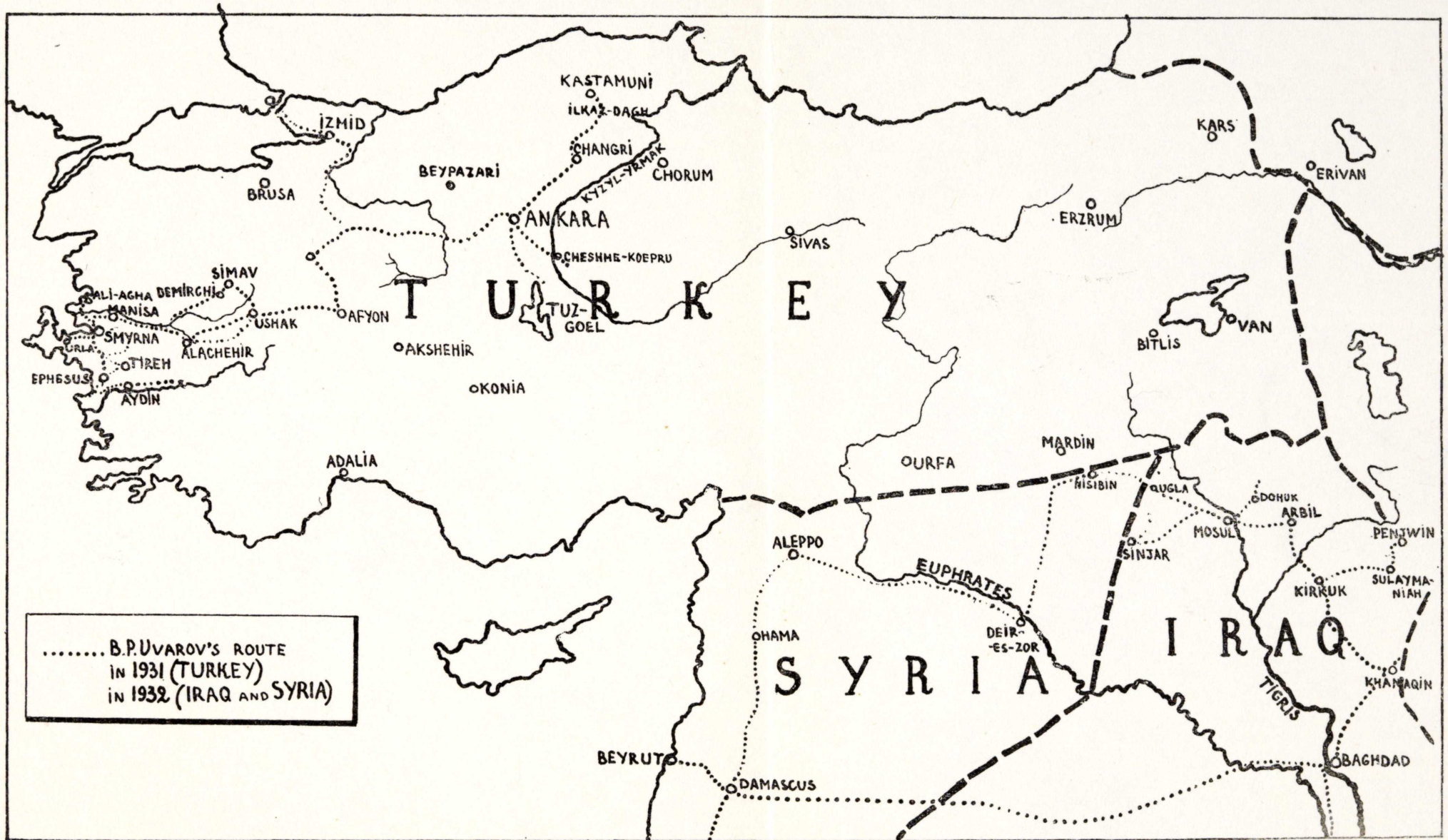
Damascus was reached from Aleppo, and the mighty chains of Lebanon and Anti-Lebanon crossed to Beirut, without any chance for collecting, though the country is most promising for an orthopterist, and scarcely touched by collectors.

Some zoogeographical results.

The data and personal impressions accumulated during my two voyages are certainly much too fragmentary for a thorough discussion of the zoogeography of the regions visited. Nevertheless, some observations of zoogeographical character should be recorded here, since they may be found useful by future students of the problem of distribution of animals in the Western Asia.

In my paper on the geographical distribution of Orthoptera in the Caucasus and Western Asia (Proc. Zool. Soc. London, 1921, pp. 447-472), I have treated the Anatolian plateau as a part of the Armenian zoogeographical district. In the light of more recent studies it appears now better to reserve the decision as to the affinity between the faunas of the Anatolian plateau and that of the still higher plateaus and mountain ranges of Armenia, until the fauna of the latter is better known. It must be realised, that our present knowledge of the Armenian fauna proper is based only on fragmentary evidence collected within the limits of the former Russian Armenia, while the enormous and greatly varied regions of the Turkish Armenia remain wholly unexplored.

In the present discussion, I will, therefore, limit myself only to the Orthoptera known to occur on the inner plateau of Anatolia, from its natural western boundary to about the Erdshias-Dagh in the east. This fauna is very typically developed in the country between



Ankara and Tu-Goel. One of its striking features is a fairly close resemblance to the fauna of the driest steppes of southeastern Russia, and even of the semideserts. Thus, such a typical genus of grassy steppes as *Stenobothrus* is very poorly represented, and the same refers to *Chorthippus*. On the other hand, the influence of the Eremian fauna, or more exactly of its Iranian elements is felt very strongly. This is evidenced by the occurrence of such typically Iranian forms as *Brunnerella mirabilis*, *Sphingonotus theodori*, *S. pilosus*, *Bolivaria brachyptera*, *Charora pentagrammica*, *Kripa coelesyriensis angusta*, etc. These Iranian elements, however, appear to be relatively recent invaders, since the majority of them are very good flyers. Moreover, some of them proved capable of penetrating westwards well beyond the geographical boundary of the Anatolian plateau. A striking example of such a penetration is offered by *Sphingonotus pilosus*, a highly typical Iranian species, which occurs sporadically in the volcanic areas as far west as Kula and Borlu (north of Salihli; see systematic part).

Another remarkable feature of the plateau fauna is the presence of apparently highly localised endemic forms, such as the wonderful *Sureyaella bella* and the new *Omocestus nanus*. These flightless species are undoubtedly very ancient autochthonous elements, belonging to the group which I call ancient Mediterranean, or Atlantic. It is particularly worthy of attention that they occur only on the flat tablelands of the plateau, which must be of considerable geological age. Unfortunately, the time at my disposal was much too short, otherwise it would have been of a great interest to undertake a thorough exploration of small ridges and table mountains scattered over the surface of the main plateau between Ankara and Konia. The attention of future investigators should be attracted to this highly promising region, where the fauna may be not very rich, but extremely peculiar.

A further interesting observation refers to the unexpectedly great degree of localisation in the distribution of certain species and subspecies over the surface of the Anatolian plateau, where a much greater uniformity of the fauna should be expected judging by the relatively flat general relief. Actually, I found considerable faunistic differences, for example, between the fauna observed in the immediate envi-

rons of Ankara and that in the steppe between Ankara and Tuz-Goel. Particularly striking example of a high localisation in the plateau fauna is offered by the numerous local forms of *Tmethis escherichi*. As will be seen in the systematic part, very distinct and quite constant geographical forms of this flightless species occur within a relatively very small range. This may perhaps be taken to indicate that the present somewhat monotonous relief of the inner plateau is a relatively recent feature, the higher mountain ridges, which used to intersect it having been gradually obliterated. Whether this is geologically sound, I am unable to decide, but the attention of future faunists should be drawn to the fact, that the range of perfectly good geographical subspecies occurring on the Anatolian plateau is often surprisingly small. Accordingly, the number of such local forms, and probably of strongly localised species may be expected to be very high.

The question of the northern boundary of the plateau fauna requires more study than I was able to do. My traverse from Ankara to Kastamuni has shown, however, that the change from the typical plateau fauna to the characteristic fauna of the Pontian ridges is very striking. It is north of Changri, with the ascent of Kai-Dagh, that one notices the appearance of *Stenobothrus zubowskyi*, *St. fischeri*, *Chorthippus dorsatus loratus*, *Dociostaurus brevicollis*, while, on the other hand, some typical plateau species, like *Sphingonotus turcicus*, *S. nebulosus anatolicus* and even *S. theodori* ascend almost to the top of the southern slope of Kai-Dagh. There is no doubt that Kai-Dagh may be regarded as the frontier ridge delimiting the plateau district from the north. The next important ridge, Ilkaz-Dagh, has no trace of the plateau fauna and its interesting population consists of species mainly closely related to, or even identical with, those of the South Russian steppes. Of course, there are also some endemic elements, like *Chorthippus ilkazi*.

Systematic part.

The following list includes the species collected by myself in 1931 and 1932, as well as some received from other sources. An opportunity was taken to submit to a critical examination a number of spe-

cies which were inadequately known, as well as to make preliminary revisions of certain genera and groups of species.

The list is not complete even as far as my own collections are concerned. It does not contain any *Pamphaginae* which I reserved for future studies. Specimens of *Poecilimon* and *Isophya* were sent to Dr. W. Ramme who is monographing these two genera, while certain species of *Sphingonotus* are with Mr. Mishtchenko who is working on a revision of that difficult genus.

MANTIDAE

1. *Eremiaphila turcica* Westwood.

E. Iraq: Khanaqin, 26.V.1932; Zirga Zarow hills, Arbil distr., 31.V.1932.

This species was originally described from «Turkey» without a more exact indication of its locality, but the type belongs to a collection brought from Baghdad by Mr. W. K. Loftus, together with some antiquities from Nineveh. It is certain, therefore, that it was from Mesopotamia and very probably from the ruins of Nineveh which lie on the Tigris opposite Mosul.

There is a considerable sexual dimorphism in the size, as will be seen from the following measurements:

Total length ♂ 17, ♀ 28; pronotum ♂ 3.2, ♀ 5; elytra ♂ 7, ♀ 13; hind femur ♂ 7, ♀ 11 mm.

2. *Eremiaphila hauensteini* Werner.

S. Turkey: Urfa, 1931 (Eshref Bey).

Giglio-Tos (Tierreich, Mantidae, p. 52) regarded this species as synonymous with *E. zetterstedti* of Burmeister (not of Lefebvre), renamed *E. burmeisteri* by Saussure, but Burmeister's description is quite insufficient to recognize his species. Werner's description of *E. hauensteini* is also very brief, but my Urfa specimen agrees with it in the extremely well developed tubercles at the hind pronotal mar-

gin, and in the uniformly brownish wings. Moreover, *E. hauensteini* was described from Aleppo, while Burmeister's species was from Arabia.

3. **Eremiaphila genei** Lefebvre.

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

4. **Ameles heldreichi** Brunner-Wattenwyl.

Western Anatolia: Ali-Agha, North of Menemen, Smyrna prov., 18.VII.1931.

5. **Bolivaria brachyptera** (Pallas).

Anatolian plateau: between Ankara and Tuz-Goel, 14.VIII.1931.

6. **Rivetina baetica caucasica** (Saussure)?

Western Anatolia: Menemen, Smyrna prov., 18.VII.1931; Burnova nr. Smyrna, 26.VII.1931; Demirchi, S. of Simav, 3-4.VIII.1931.

In all Anatolian specimens the male elytra are considerably shorter than the abdomen; in the female they are shorter than pronotum.

GRYLLIDAE

7. **Oecanthus pellucens** (Scopoli).

Western Anatolia: Burnova nr. Smyrna, 15.VII.1931; Tireh, 20.VII.1931; Habiblar, mts. S. of Tireh, 21.VII.1931; Ortakche on r. Menderes, E. of Aydin, 22.VII.1931; Demirchi; S. of Simav, 3-4.VIII.1931.

8. **Gryllus burdigalensis** (Serville).

Western Anatolia: Burnova nr. Smyrna, VII.1931.
Commonly comes to light.

9. **Gryllus domesticus** (Linnaeus).

Anatolian plateau: Polatli, Ankara prov. (Sureya Bey).

It would be interesting to know whether the house-cricket occurs on the plateau in the open, or only in houses.

10. **Gryllus tartarus obscurior** nom. nov.

1920. *Gryllus tartarus obscurus* Uvarov, Ent. Mon. Mag., 3 ser., VII, p. 50 (nec *Gryllus locusta obscurus* Linnaeus, 1758).

Iraq: Uglá post on the road Mosul-Nisibin (Jezireh steppe), 2.VI.1932.

The dark subspecies of the Centralasian *Gryllus tartarus* has been recorded by me from the semi-desert areas of Caucasus and from Northern Persia (*l. c.*), as well as from Aleppo in Syria (Journ. Bombay Nat. Hist. Soc., xxviii, 1922, p. 370) and from Macedonia (Trans. Ent. Soc. London, 1923, p. 146). Miram recently recorded from Crimea a dark specimen of *G. tartarus* which, however, she referred to the typical form (Ann. Mus. Zool., Leningrad, 1927, p. 128).

11. **Gryllomorpha willemsi** sp. n.

Allied to *G. (Discoptila) krüperi* Pantel, but separated from it by the absence of elytra; pronotum obtusely excised behind; and the last outer spine of the hind tibia being subequal in length to the spur nearest to it.

♂. Uniformly brownish-black; antennae, palpi and legs rufous; cerci pale yellowish; body and extremities hairy; head, pronotum and sides of the body bearing black bristles, in addition to hairs.

Head short, strongly convex above; clypeus inflated; fastigium of vertex a little broader than the first antennal joint; lateral ocelli large, pale rufous, much nearer to the eye, than to the median ocellus. Apical article of the maxillari palpus equal in length to the preapical

one, widened to the apex and obliquely truncate, the truncation extending to more than the apical third, but less than a half.

Pronotum well rounded above, not depressed, with a faint short longitudinal depression in the middle. Anterior margin truncate, with a narrow rim. Posterior margin obtusely excised, with a sharply separated rather thick rim. Lateral lobes convex, considerably broader in front than behind.

Mesonotum shorter than pronotum, bearing anteriorly a short and thick parabolic process, excavated above, which lies under the emargination of the pronotum and represents probably the attractant gland. Metanotum about one third of the length of mesonotum.

Supraanal plate thick, transverse, with sublateral fold-like angles; the apex broadly rounded. Cercus long, reaching the apical quarter of hind tibia. Subgenital plate very large, broadly semi-elliptical; apex with a shallow obtusangular emargination.

Front tibia with two spurs; middle with three. Hind tibia feebly sulcate above; basal half with about six external and four internal short spinules; first outer spur subequal to the last spine; second outer spur about twice the length of the first; two lower spurs short; upper inner spur equal to half the length of metatarsus; lower inner spur a little longer than the upper inner. Metatarsus longer than half the tibia, with about nine spinules on the outer margin and four on the inner; inner spur longer than the outer.

Length of body, 11; pronotum, 2.5; hind femur, 7; cercus, 6 mm.

Anatolian plateau: Akchehir, 1.16.X.31, 1 ♂ (Wagner). Type in the collection of Dr. C. Willemse, Eyselshoven, Holland.

The colour and the general appearance of this curious cricket make it look very unlike a *Gryllomorpha*, and I thought at first to have an undescribed genus before me. This view was confirmed by Dr. L. Chopard, but a more thorough examination undertaken by me showed a close relationship to Pantel's species.

Judging by the coloration of this species and of *G. krüperi*, they both should be expected to lead a less concealed life, and probably occur under stones.

The type has a fully formed spermatophore under the supraanal plate and is therefore adult, so that the absence of elytra is not a larval character as one might think from the small size of the insect.

12. *Arachnocephalus vestitus* (Costa).

Western Anatolia: Ortakche on r. Menderes, E. of Aydin,
23.VII.31, 1 ♀.

Swept from *Tamarix* bushes near water.

13. *Tridactylus irremipes* sp. n.

(Fig. 1.)

Similar to *T. tartarus* Sauss. in the size and the serrate hind tibiae, but differing strongly from all known Palaearctic species by the absence of the lamellae of hind tibiae.

♂. Uniformly black, shiny; head and pronotum with scattered fairly deep punctures. Front legs testaceous; middle and hind femo-

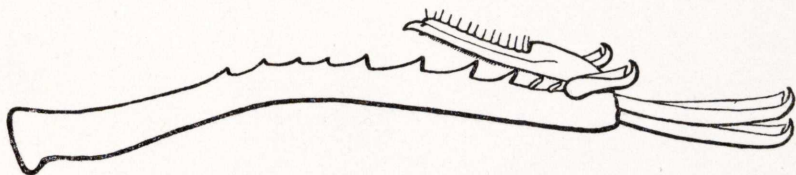


Fig. 1.—*Tridactylus irremipes* sp. n. Hind left tibia and tarsus.

ra black, with the knees testaceous; middle tibiae testaceous, with the base blackish and an indefinite pale fascia about the middle. Elytra black, punctured; costal field pale; wings absent.

Hind tibia curved with 9-10 low, strong teeth on each margin; spurs of the upper pair as in *T. tartarus*, with the lamellate part well developed, the apex hooked. Lower spurs long, lamellate to the apex which is hooked; metatarsus longer than lower spurs, with the apex hooked and with a small preapical hook at the base of the apical one on outside; lower outer carina of metatarsus lamellate in the basal third.

Cercus longer than anal appendage; its second joint somewhat shorter than the first. Subgenital plate subemarginate at the apex.

Total length, 7.5; pronotum, 2.5; elytra, 2.5; hind femur, 5 mm.

Western Anatolia: Habiblar, in the mts. South of Tireh, 21.VII.1931, 4 ♂♂, 4 larvae.

This is a very remarkable insect, in view of the complete lack of specialisation in the spines of hind tibiae, while it differs from its apparently near relative, *T. tartarus*, in the colour characters, in the puncturation of head and pronotum, and in the structure of the metatarsus.

It is very interesting to note that the absence of specialised tibial spines appears to have a connection with the habitat in which *T. irremipes* was discovered. The insects were found, together with the more numerous *T. variegatus*, on the wet sand near a small spring in the otherwise very dry mountains on the way from Tireh to Habiblar. The spring water made a very small pool and the moisture from it spread a couple of feet down the slope. There was, accordingly, practically no open water available for occasional swimming, in which other species of *Tridactylus* living on sandy banks of rivers often indulge, and the weakening of the specialisation in the hind tibiae may be regarded as a result.

14. ***Tridactylus variegatus*** Latreille.

Western Anatolia: Habiblar, in the mts. South of Tireh, 21.VII.1931.

Taken together with the preceding species.

TETTIGONIIDAE

15. ***Leptophyes albovittata*** (Kollar).

Western Anatolia: Goelchik in Bozdagh mts., Smyrna prov., 29.VII.1931; Demirchi, S. of Simav, about 3.000 ft., 3.-4.VIII.1931.

16. ***Acrometopa syriaca*** (Brunner-Wattenwyl).

Western Anatolia: between Tireh and Ephesus, 20.VII.1931; Habiblar in the mts. S. of Tireh, 21.VII.1931.

17. **Acrometopa servillea** (Brullé).

Western Anatolia: Burnova nr. Smyrna, 26.VII.1931; Demirchi, S. of Simav, 3,000 ft., 3-4.VIII.1931.

The lobe at the base of the ovipositor is a very characteristic feature of the female of this species. In Ramme's figure (Eos, III, 1927, p. 120, fig. 8c, l) the lobe is represented as very short, triangular, while actually it is considerably longer and spine-like.

18. **Phaneroptera quadripunctata** (Brunner-Wattenwyl).

Western Anatolia: Burnova nr. Smyrna, 26.VII.1931.

19. **Tylopsis liliifolia** (Fabricius).

Western Anatolia: Tireh, 20.VII.1931; Burnova nr. Smyrna, 15.VII.1931.

20. **Conocephalus fuscus turanicus** (Semenov).

S. Turkey: Urfa and environs, 1931 (Eshref Bey).

Kurdistan: between Sulaymaniah and Penjwin, 28.V.1932.

Tarbinsky recently synonymised this insect with the typical *fuscus* (Bull. Leningrad Inst. Controll. Farm Forest Pests, No. 2, 1932, p. 186), without even discussing the characters on which the subspecies was based. Although these characters consist only in the absolute measurements, they appear sufficiently constant and important to be used in separating the southern subspecies from the northern one.

21. **Saga cappadocica** Werner?

Anatolian plateau: Ankara, 15.VIII.1931, 1 ♂, 1 ♀.

No proper description of *S. cappadocica* was given by Werner and the identification is accordingly uncertain. My specimens agree

fairly well with the few characters indicated by Werner, except that they are green in colour, which is scarcely of any importance. Werner's species was described from Eregli, that is essentially from the same natural region with Ankara.

22. **Saga puella** Werner.

Anatolian plateau: Demirchi, S. of Simav, about 3,000 ft., 3.4. VIII.1931, 1 ♂, 1 ♀.

22a. **Saga** sp.

A third species of *Saga*, similar to *serrata* F., was taken by me at Urla, S. W. of Smyrna, but the systematics of the genus *Saga* are in such a confusion that most determinations appear more or less doubtful and useless for faunistic purposes.

23. **Drymadusa angorensis** Uvarov.

Anatolian plateau: mt. Kai-Dagh, between Ankara and Changri, 10.VIII.1931, 2 ♀ ♀.

This interesting species was described by me from a single male. The females have no trace of the black frontal fascia, and their measurements are, as follows: length of body, 35; pronotum, 11; elytra, 6; hind femur, 27; ovipositor, 15 mm.

24. **Drymadusa magnifica** Werner.

(Fig. 2.)

This species has been originally described from three larvae from Samos and one female from Ordubad in the Araxes valley, and there can scarcely be any doubt that two species were involved. The species from Samos is probably identical with *Paradrymadusa ornatipennis* described recently by Ramme from that island (*Deutsche Ent. Zeitschr.*, 1926, p. 282) and differing from Werner's description of the larvae only by the absence of the typical

pattern on the pronotum. That pattern, however, is usually much more pronounced in larvae than in adults, and its presence or complete absence in adults lies within the limits of individual variation in certain species, such as *Paradrymadusa rammei* (see below).

We could, therefore, regard *P. ornatipennis* as a synonym of *D. magnifica*, if one of Samos larvae was selected as the type of the latter; or else the female from Ordubad can be selected as the type and the name *ornatipennis* becomes available for the Samos species. This second course is perfectly legitimate, since all the most important characters in Werner's description (such as the

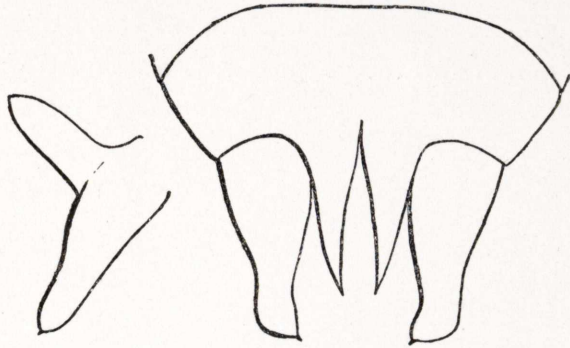


Fig. 2.—*Drymadusa magnifica* Werner. End of male abdomen and a cercus isolated.

development of elytra, length of ovipositor and the measurements generally) are taken from the Ordubad female, which therefore represents a cotype of the species. Accordingly, Ebner was fully justified in giving a redescription (*Acta Soc. Entom. Čechosloven.*, 20, p. 2) of *D. magnifica* based on specimens from Ordubad, and thus fixing the original female from that locality as the type of the species. Since Ebner's description is not accompanied by illustrations of genitalia, I think it useful to reproduce here a figure of the male genital appendages, taken from a topotypical specimen (fig. 2).

As regards the distribution of this species, Werner's records from Serai-Dagh and from between Konia and Kaisarie (*Ann. Naturhist. Hofmus. Wien*, xx, p. 2) were based on larvae and cannot be accepted. Shugurov (*Zapiski Novoross. Ob. Est.*, xxxvii, 1911, p. 11) reported the species from Crimea, but this was an obvious misidentification (see Miram, *Ann. Mus. Zool. Acad. Sci. Leningrad*, 1929, p. 461). There are only a few reliable records and they all refer to the Araxes valley. I know *D. magnifica* from specimens in the Tiflis Museum taken at Ordubad and at Karmalinovka, in the mountains NW. of Ordubad.

25. *Drymadusa adzharica* sp. n.

(Fig. 3.)

Well distinct from all known species by the elytra neither fully developed, nor rudimentary, but extending to the base of the eighth tergite.

♂. Of more than medium size for the genus. General coloration pale greyish-buff, with the typical pattern of the head and pronotum in brown. Frons with a complete black band between eyes.

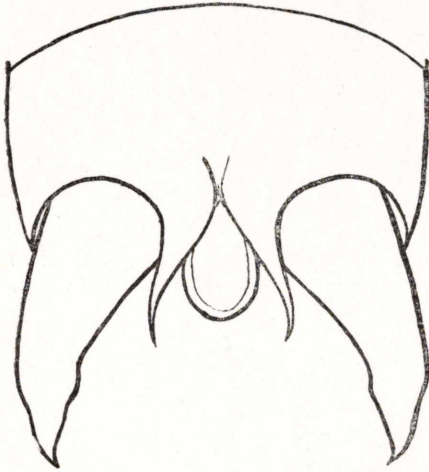


Fig. 3.—*Drymadusa adzharica* sp. n.
End of male abdomen.

Elytra indefinitely marked with greyish-brown, brown and pale buff; two oblong brown spots on a pale background in the apical third of the discoidal field. Front femur with eight, middle femur with 4-5 small black spines on the lower front margin. Hind femur with 8-9 outer and 10-11 inner black spines below; outer face pale-buff, with a series of small brown dots along the median line, and a small brown spot immediately above the end of the series.

Last tergite with a pair of long narrow appendages, the ends of which are strongly decurved, almost hook-like (this cannot be shown in the figure representing the view from above). Supra-anal plate small, oval, with a deep depression. Cercus moderately long, somewhat incurved, rounded in the general shape, but with a small swelling near the apex, which is incurved and pointed. Subgenital plate with a triangular emargination.

Length of body, 43; pronotum, 11; elytra, 24; hind femur, 34 mm.

W. Transcaucasia: Lomasheni near Artvin, 28.VI.1911, 1 ♂ (J. Voronov). Type in the British Museum.

This species has been misidentified by me in the Tiflis Museum as *D. recticauda* Werner and recorded under that incorrect name (Proc. Zool. Soc. London, 1921, p. 459). The reason for revising that iden-

tification now is that even the female of *D. recticauda* (and no male of that species is known) is described as possessing the elytra reaching the apex of abdomen, while in my species the elytra are distinctly abbreviated even in the male and should be relatively still shorter in the female. Again, the male of my new species has no definite pale orbicular spots on the elytra such as observed in *D. spectabilis*, with which Werner compares his species. Unfortunately, I have only a male of the new species before me now, but in the Tiflis Museum there were some females, as well, and I made a note of their measurements, as follows: length of body, 36-41; pronotum, 10-11; elytra, 23-25; ovipositor, 26-30 mm.

Werner's species has been described from Afium-Karahissar in the west of the Anatolian plateau, while mine is from its north-eastern edge; this also suggests that they are distinct, since most species of *Drymadusa* are local in their distribution.

This was probably also the species reported by Adelung (Horae Soc. Ent. Ross., 38, 1907, p. 41) from two localities in the same district under the name *D. recticauda*. His identification was based on two larvae and the value of it is obviously very small, in spite of the fact that it has been confirmed by Werner himself.

26. **Paradrymadusa rammei** Uvarov.

(Figs. 4, *R*, and 5, *R*.)

Anatolian plateau: Mt. Kai-Dagh, between Ankara and Changri, 10.VIII.1931; Ankara; between Ankara and Tuz-Goel, 14.VIII.1931; between Ankara and Cheshme-Keupri on r. Kyzyl-Yrmak, 17.VIII.1931.

I described this species from a single pair taken at Urfa (Ann. Mus. Zool. Acad. Sci., Leningrad, 1929, p. 634), but the figure of the male genitalia accompanying the description was not sufficiently exact, and I thought it useful to illustrate both sexes once more from the types.

The specimens collected by myself in the Ankara region differ from the types in their slightly smaller average size, but particularly in the coloration. The types are of uniformly pale ochraceous colour,

practically without any markings, but the Ankara specimens are brownish-grey, or even reddish-brown, mottled with brown; their pronotum, particularly in the male sex, often bears a brown pattern typical for *Drymadusa*. This differences in coloration, although considerable, cannot be regarded of taxonomic value, the more so that the pale colour of the types may be due to their previous preservation in a liquid. A careful comparison of genitalia of both sexes did not reveal any differences.

P. rammei is very closely allied to *P. anatolica* Werner, describ-

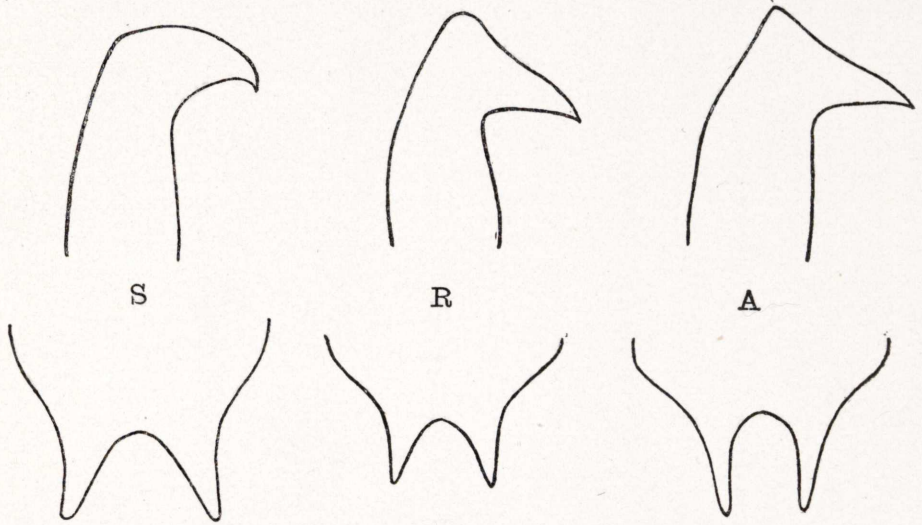


Fig. 4.—S, *Paradrymadusa satunini*; R, *P. rammei*; A, *P. anatolica*.
Last tergites and cerci of the males.

ed from the Cilician Taurus, to *P. satunini* Uvarov, from the Araxes valley in Transcaucasia and to *P. maculata* Ebner, from Diarbekr. All these species are known to me from their types and I take this opportunity to discuss the group.

Werner's description of *P. anatolica* is not only lacking in detail, but even misleading, since the male cerci are described as «conici, inermes», while actually they are provided with a long and strongly pointed apical spine (fig. 4, A). As regards *P. satunini*, my description of the male cercus was also inaccurate and a figure taken from a topotype is reproduced here (fig. 4, S); the female of that species remained undescribed and its genital sclerites are described in the following key and figured (fig. 5, S). *P. maculata* was described

from a single female, and this species is discussed separately (p. 52, fig. 6).

Key to the *anatolica*-group of the genus *Paradrymadusa*.

- 1 (2). ♂: Cercus broadly rounded apically, with the tooth strongly curved. Appendages of the last tergite as long as the tergite, strongly divergent (fig. 4, *S*).
 ♀: Seventh sternite widened and emarginate behind; surface flat, with a large convexity in the middle near the hind margin. Subgenital plate large, transverse, convex; lateral pits small; posterior emargination and the lobes obtusely angulate (fig. 5, *S*). Ovipositor

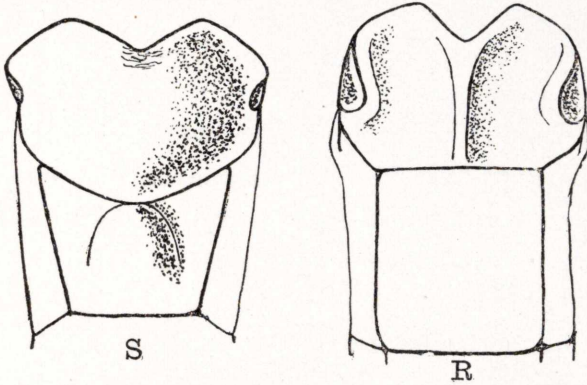


Fig. 5.—*S*, *Paradrymadusa satunini*; *R*, *P. rammei*. Last sternites and subgenital plates of the females.

- ovipositor half again as long as pronotum (length of body, 26; pronotum, 7; elytra, 3; hind femur, 22; ovipositor, 11.5 mm.) . **satunini.**
- 2 (1). ♂: Cercus with the apex distinctly angular; the tooth longer, scarcely curved (figs. 4, *R*, *A*).
 3 (4). ♂: Appendages of the last tergite shorter than the tergite, somewhat divergent. Apical angle of the cercus rounded (fig. 4, *R*).
 ♀: Seventh sternite flat, rectangular, longer than broad. Subgenital plate obtusely roof-shaped, with the sides slightly concave; lateral pits large (fig. 5, *R*). Ovipositor about twice as long as pronotum..... **rammei.**
- 4 (3). ♂: Cercus with the apex acute. Appendages of the last tergite slender, parallel, quite as long as the tergite (fig. 4, *A*).
 ♀: Unknown..... **anatolica.**

27. *Paradrymadusa maculata* Ebner.

(Fig. 6.)

This species was described from a single female, previously preserved in alcohol, and no mention was made in the description of the structure of the external genitalia. Thanks to the usual courtesy of Dr. M. Beier I received the type from the Vienna Museum and its abdomen proved to be so much shrivelled that it was impossible to study the terminal sternites until the specimen was relaxed and its abdomen stuffed with cotton-wool. This delicate operation was undertaken for me by my friend and colleague Mr. W. E. China, who also made the necessary illustrations, and I wish to thank him here for his valuable assistance.

The structure of the terminal sternites, as far as we were able to make it out, is, as follows.

Seventh sternite (*VII*) strongly narrowed anteriorly, trapezoidal; its surface appears to have been rather convex, but it is difficult to decide whether it was definitely gibbose near the posterior margin. Subgenital plate (*S*) is almost wholly membranous, with a pair of irregularly rounded lateral lobes (*L*) placed almost perpendicularly to the plate (it is not certain whether these lobes would be placed closer to the base of the ovipositor in fresh specimens).

This structure of the subgenital plate appears very peculiar and quite different from what is known in other species of the genus. However, a close study of the female plates of *P. satunini* and *P. rammei* helps to understand the modifications observed in *P. maculata*. In those two species the subgenital plate is provided with a pair of lateral pits. In *P. satunini* the pits are very small, but in *P. rammei* they are much larger and their inner margin is formed by a raised fold in the plate. These folds are obviously forerunners of the lateral lobes which are so strongly developed in *P. maculata*. The surface of the plate in *P. satunini* is convex and strongly chitinised, except at the apex of the emargination, where the surface is irregularly wrinkled, apparently because of an incomplete chitination. In *P. rammei*, the surface of each half of the plate is slightly concave, and faint transverse striation is perceptible, which also suggests that the outer

layer is not strongly chitinised. We see, therefore, that the subgenital plate of *P. maculata* exhibits only a further development of the tendencies apparent in *P. rammei*, and even in *P. satunini*. It is interesting to note that the seventh sternite in *P. maculata* appears to resemble more that structure in *P. satunini*, than in *P. rammei* while the relation is reversed in the case of subgenital plate.

While the differences between *P. maculata* and the two species just discussed are perfectly obvious, it is impossible at present to separate *P. maculata* from *P. anatolica*,

since the opposite sexes are known for these two species. However, there is no suggestion of the characteristic marbled pattern in *P. anatolica* and the two species are probably distinct. To decide this definitely, we must wait until the male of *P. maculata* and the female of *P. anatolica* become known.

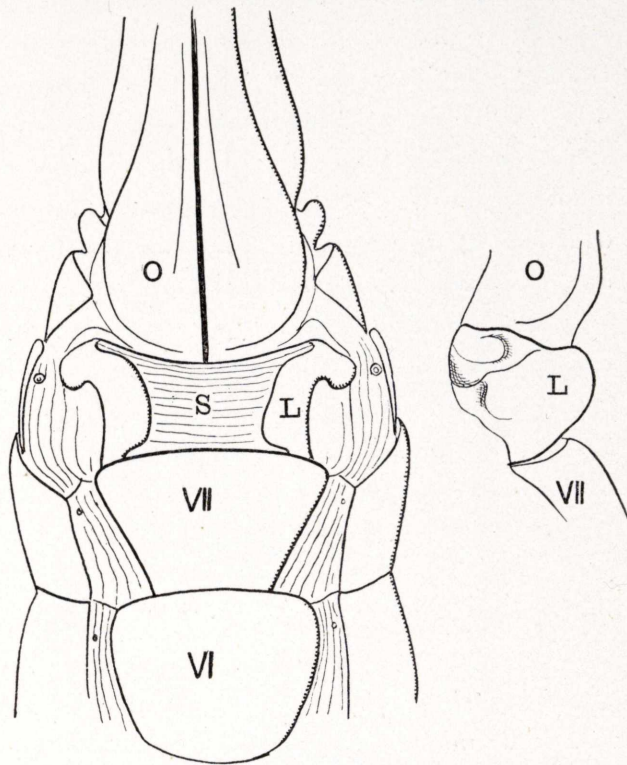


Fig. 6.—*Paradrymadusa maculata*, end of female abdomen from below and from the side. *S*, subgenital plate; *L*, its lobe; *O*, ovipositor.

Gen. **Sureyaella** nov.

Somewhat similar in the general appearance and the type of coloration to a *Drymadusa*, but of very small size and not related to the group *Drymadusae*.

Very small, brachypterous. Fastigium of vertex broader than the first antennal joint. Pronotum short, truncate behind; disc flat and even faintly concave; median carina slightly indicated near the hind margin; no proper lateral carinae, but lateral lobes form very distinct rounded angles with the disc; the lobes are strongly narrowed downwards, slightly longer than deep. Prosternum unarmed. Mesosternal and metasternal lobes short, angular. Elytra in the male inflated, a little shorter than pronotum; in the female short, but overlapping on the back. Anterior tibiae with three spines on the upper outer side. Posterior femora unarmed, less than three times as long as pronotum. Posterior tibiae with one pair of spurs below. Free plantula of the hind tarsus a little shorter than the first tarsal joint. Posterior tergite of male with a pair of short spines; male cercus with a postmedian tooth. Female ovipositor short and stout, somewhat recurved, serrate near the apex, the disc smooth.

28. **Sureyaella bella** sp. n.

(Fig. 7.)

♂ (*type*). General coloration pale greyish-stramineous. Face with some indefinite small brownish markings; head above with a very pale greyish longitudinal fascia enclosing a narrow median line of ground colour. Pronotum pale stramineous above; lateral lobes brownish, with the lower margin broadly stramineous; this pale border extends along the posterior margin of the lobe up to the lower edge of elytron, and is very sharply separated from the brownish disc of the lobe. Elytra shorter than pronotum, a little longer than at the base broad; outer margin practically straight and horizontal; apex rounded-truncate; inner margin moderately oblique, weakly sinuate; speculum elongate. Legs lightly spotted with brownish. Hind femur strongly inflated in the basal half, spotted with brownish above; outer surface slightly darker below the median line.

Last tergite with two slightly incurved narrow appendages, separated by round emargination. Cercus subcylindrical, somewhat compressed dorso-ventrally and slightly sinuate, strongly hirsute, with a curved blackish hook beyond the middle. Subgenital plate much longer than broad; hind margin obtusely excised.

♀ (*paratype*). Of the same general coloration as the male, but brown pattern much more strongly expressed and the pale parts, except the broad border of pronotal lobes, are covered with more or

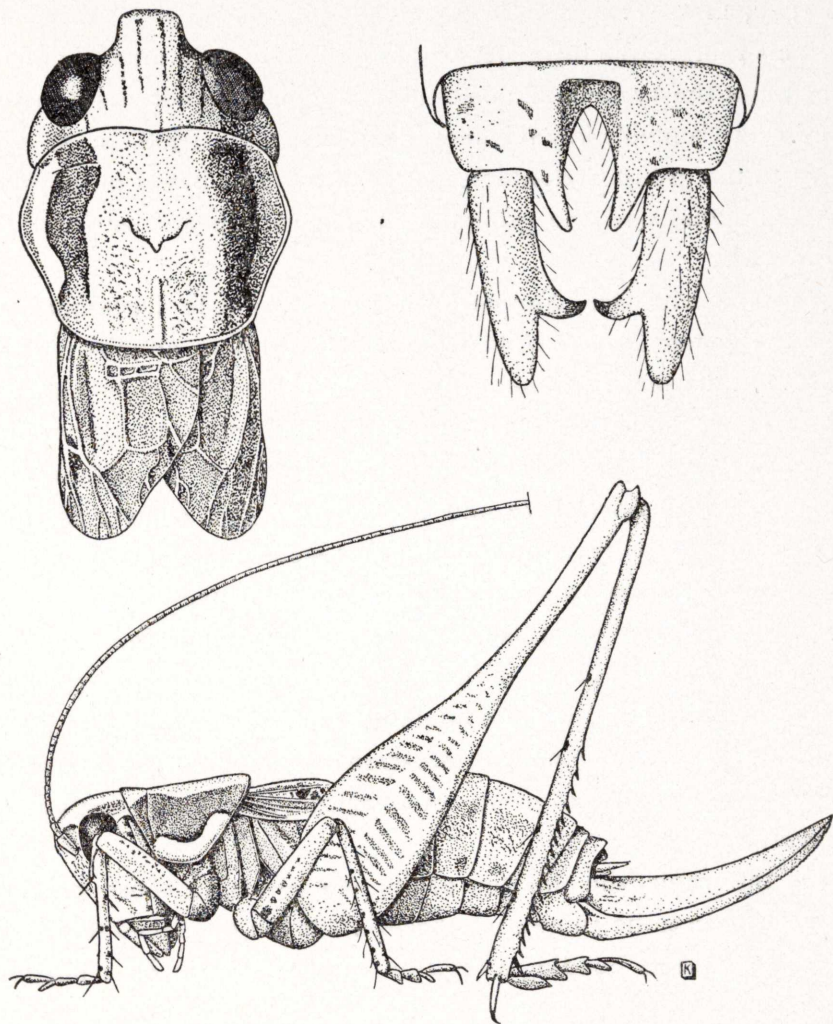


Fig. 7.—*Sureyaella bella* gen. et sp. n. Head, pronotum, elytra and apex of abdomen of the male (above); side view of the female (below).

less dense marble-like brown pattern and dots. Abdomen with the sides brown, and a very broad median stripe constricted in the first half of each tergite.

Subgenital plate trapezoidal, feebly convex, with a faint median carina; hind margin broadly and shallowly excised. Ovipositor about twice the length of pronotum.

Length of body, ♂ 12, ♀ 14; pronotum, ♂ 3, ♀ 3.5; elytra, ♂ ♀ 2; hind femur, ♂ 11, ♀ 12; ovipositor, ♀ 7 mm.

Anatolian plateau: between Ankara and Tuz-Goel, 14.VIII.1931, 10 ♂♂, 11 ♀♀.

This remarkable little Decticid is undoubtedly a member of a new genus, but the systematic position of the genus is not easy to determine. In Caudell's key (*Genera Insect.*, fasc. 72, 1908, p. 3) it runs down to the group Ctenodectees, but that key is based on purely formal characters and the grouping of genera appears far from being natural.

In its minute size, *Sureyaella* has no parallel in Decticinae apart from the genus *Ctenodecticus*, from which it differs abundantly in the short and flattened above pronotum, in the relatively short free plantula of hind tarsus, in the more developed elytra and in the structure of genital appendages. There is a certain resemblance between *Sureyaella* and *Drymadusa*, particularly in the general shape of body and pronotum, as well as in the genital appendages, but the armature of hind tibiae, the unarmed prosternum and well developed free plantulae separate the new genus from the group *Drymadusae*. One genus of that group, namely *Bergiola* (see Uvarov, *Eos*, iv, 1928, p. 243) while containing species of scarcely larger size than *Sureyaella* and some with prosternal spines absent, still preserves other characters of its group and therefore is quite distinct from *Sureyaella*.

On the whole, the affinities of the new genus to those previously known appear to be somewhat obscure. It can be placed temporarily near *Ctenodecticus* pending a revision of the generic classification of *Decticinae*.

The type and paratypes of *Sureyaella bella* have been found by myself and Sureya Bey during an automobile excursion from Ankara to Tuz-Goel and back, near the small village Bel-Kioi. The locality is described in some detail in the introduction to the present paper (see p. 33).

These little Decticids are almost as difficult to find and to catch, as *Ctenodecticus pupulus* of Central Spain. They hide in tufts of *Thymus* and come out of them only after being almost trampled upon; one incautious movement is sufficient to make the insect jump

and it is then almost certainly lost. The best way of catching them was to place the net very quietly as near as possible to the insect and then to make it jump into it, by moving a hand, or foot, towards it from the side opposite to the net. Nor is an insect already in the net to be counted as taken, because they easily jump out of the net and the chances of finding them again in the grass are very small.

It gives me a great pleasure to dedicate this remarkable and extremely pretty little insect to my friend Sureya Bey and thus perpetuate his name in the history of entomology of Asia Minor, to which he is so largely contributing.

29. **Anterastes anatolicus** sp. n.

(Fig. 8, A.)

Closely allied and very similar to *A. serbicus* Brunner, but differing from it in the following characteres.

♀ (*type*). Larger. Pronotum relatively a little longer, with the hind margin more rounded. Elytra larger, projecting behind the posterior margin of metanotum. Subgenital plate roof-shaped, almost carinate along the middle, with a deep acutangular emargination and acute slightly inflated lobes. Ovipositor relatively longer, gradually recurved.

Length of body, 20; pronotum, 6; hind femur, 18; ovipositor, 17 mm.

Anatolia: Orhan-ili, 10. VI. 1930, 1 ♀ (*Sureya Bey*).

Dr. Ramme obligingly

examined this insect and suggested that it represents either a new

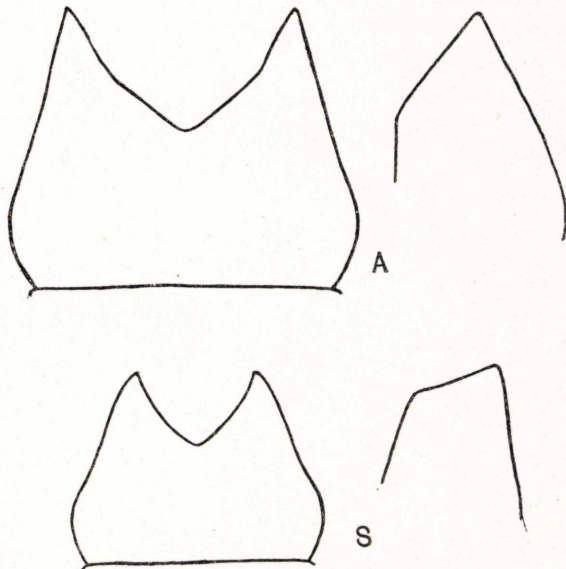


Fig. 8.—A, *Anterastes anatolicus* sp. n.; S, *Anterastes serbicus* Br. W. Female subgenital plate, and one of its lobes in profile.

subspecies of *A. serbicus*, or a new species. The difference in the shape of the subgenital plate appears to me sufficiently great to be of specific value (see fig. 8) and I venture, therefore, to describe a new species on the female sex alone.

30. **Rhacocleis turcicus** (Uvarov).

1930. *Scirtobaenus turcicus* Uvarov. Eos, vi, p. 354.

Anatolian plateau: Demirchi, S. of Simav, 3,000 ft., 3.-4.VIII. 1931; Ankara, 15.VIII.1931; mt. Kai-Dagh, between Ankara and Changri, about 4,000 ft., 10.-13.VIII.1931.

Western Anatolia: Tireh, 20.VII.1931.

I am obliged to Dr. Ramme for his assistance in referring this insect to the proper genus, where it comes in the vicinity of *Rh. germanica*, but differs from it well in genitalia of both sexes. My original generic assignment was, however, also correct, since a careful comparison of the genotypes of *Rhacocleis* and of *Scirtobaenus* does not permit me to regard them as belonging to different genera, and the following generic synonymy must be accepted:

Rhacocleis Fieber, 1853 = *Scirtobaenus* Pantel, 1886 (*syn. nov.*)

I found this graceful Dectid quite numerous at Demirchi in company with *Metrioptera incerta*. Both insects were found in dense bushes of *Salix*, *Rosa* and *Rubus* near a little brook, and they were exceedingly difficult to catch, since at the slightest alarm they dived into the bushes entangled with spiny brambles.

31. **Pholidoptera castaneoviridis** (Brunner Wattenwyl).

Western Anatolia: Demirchi, S. of Simav, about 3,000 ft., 3.-4.VIII.1931; between Demirchi and Simav, 5.VIII.1931; Bozyuk, 1930 (Sureya Bey).

Ramme has pointed out recently (Mitt. Zool. Mus. Berlin, 16.Bd., 1930, p. 806) that the green colour of the types was due to their having been stuffed with green cotton-wool. The specimens

collected by me had certainly no trace of green colour when alive, and the specific name is a very unsuitable one.

The species has been so far known only from Brussa, but appears to be distributed widely in Western Anatolia, reaching the upper limit of mediterranean vegetation.

32. **Pholidoptera chabrieri** (Charpentier).

Western Anatolia: Menemen, Smyrna prov., 1930 (Sureya Bey).
Known in Asia Minor only from the Bithynian Olympus and Ephesus.

33. **Pholidoptera iraka** sp. n.

(Figs. 9, *I*, and 10, *I*.)

Belonging to the group of *zebra-satunini*, more closely allied to the last named, but different from both in the structure of external genitalia of both sexes.

♂ (*type*). Size, general coloration and pattern as in *P. satunini*. Ninth (last but one) tergite black only on the sides, with a transverse series of brown spots along the anterior margin. Tenth (the last) tergite pale buff, with a broad wavy anterior margin and the sides black; its posterior margin broadly rounded-truncate, with a small round emargination in the middle. Cercus stout, particularly in the basal half, armed with an inner tooth beyond the middle. Subgenital plate large, yellow, with black sublateral fascia; hind margin angularly excised.

♀ (*paratype*). Subgenital plate thick, transversely-triangular, with a deep angular transverse furrow in the basal third; apical excision narrow, moderately deep, continued as a furrow; lobes obliquely rounded. Ovipositor stout, feebly recurved, a little shorter than hind femur.

Length of body, ♂ 30, ♀ 31; pronotum, ♂ 12, ♀ 13, hind femur, ♂ 22, ♀ 23; ovipositor, ♀ 18 mm.

Kurdistan: Between Sulaymaniah and Penjwin, 28.V.1932, 10 ♂ ♂ (including the type), 7 ♀ ♀.

W. Persia: Luristan: river Abbasan to r. Kahi-Bamu, 13.V.1914, 1 ♀; river Abbasan, 15.V.1914, 1 ♀; river Abbasan to Sheikh-

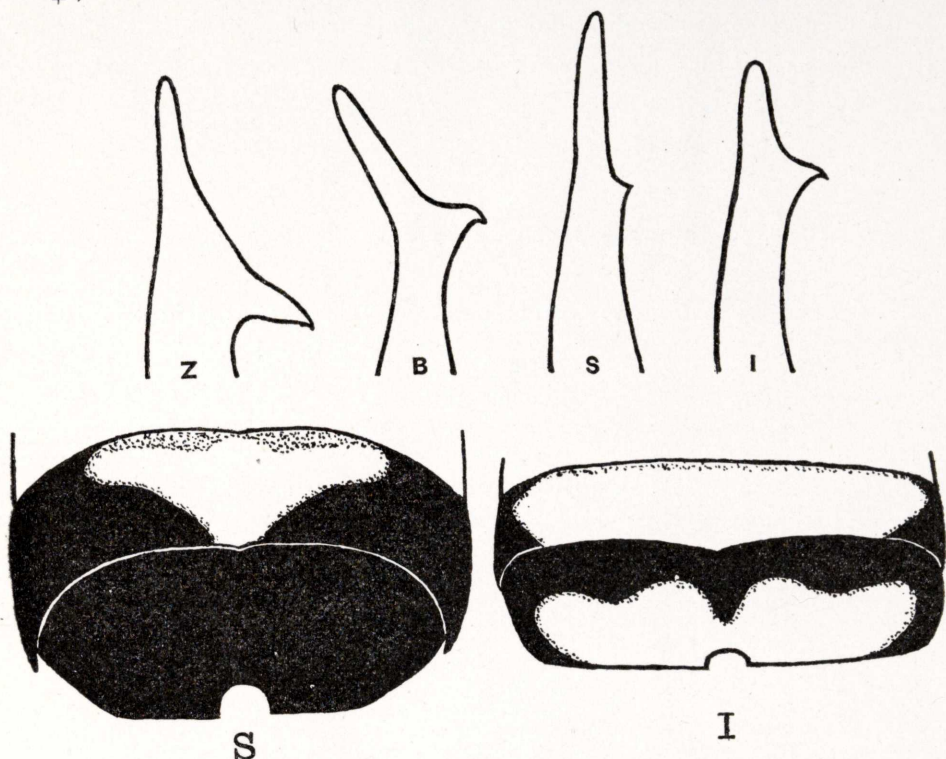


Fig. 9.—Z, *Pholidoptera zebra* Uv.; B, *Ph. bakhtiara* sp. n.; S, *Ph. satunini* Uv.; I, *Ph. iraka* sp. n. Last tergites and cerci of the male.

Nazwad, 16.V.1914, 2 ♀♀ (Nesterov); Gotvend, 1 ♂, 1 ♀ (Escalera; Madrid Museum).

34. ***Pholidoptera bakhtiara* sp. n.**

(Figs. 9, B, and 10, B.)

Similar to *Ph. satunini* Uv., but widely different from it in the genitalia of both sexes.

♂ (*type*). Size a little smaller than in the two preceding species; coloration castaneous (not reddish-castaneous as in *Ph. zebra* and *Ph. iraka*), with the pattern typical for the group.

♂. Last tergites very similar in their shape and coloration to those in *Ph. iraka*. Cercus with a large tooth placed in the middle;

the apical part of the cercus is bent outwards, but this may be due to shrinkage, as the specimen is somewhat teneral. Subgenital plate large, with acutangular excision.

♀. Subgenital plate very large, not incrassate, rounded pentagonal, with a parabolic apical emargination and rounded lobes; near its base there is a broad and shallow transverse depression interrupted in the middle. Ovipositor thick, very slightly recurved near the apex, shorter than hind femur.

Length of body, ♂ 24 (shrunk), ♀ 31; pronotum, ♂ 10.5, ♀ 12; hind femur, ♂ 23, ♀ 24; ovipositor, ♀ 17 mm.

Western Persia (Bakhtiary country): Gotvend, S. E. of Dizful, 1 ♂ (type), 1 ♀ (Escalera; Madrid Museum).

This species has been designated by Prof. I. Bolivar as new under the manuscript name *geniculata* and I am grateful for his permission to describe it here.

35. *Pholidoptera zebra* (Uvarov).

(Figs. 9, Z, and 10, Z.)

Kurdistan: Wulijawa, Sulaimaniah, 27.VI.1928; Penjwin, 25.VI.1928 (H. Scott); between Sulaimaniah and Penjwin, 28.V.1932.

W. Persia: Demavend, 1927 (Dzhalal Afshar); Biaze, 6.VI.1914 and Balkha, Luristan, 39.V.1914 (Nesterov); Chindaar; Gotvend (Escalera; Madrid Museum).

Described originally from Balkha and Zengizer in the Kurdish mountains on the borders of Persia and Iraq, this species proved to be fairly widely distributed over Western Persia. The following notes on the structure of genitalia, and the figures, should serve to supplement the specific description:

♂. Cercus stout and relatively short, strongly tapering beyond the tooth which is large and placed in the basal third.

♀. Subgenital plate large, pentagonal, not incrassate, with a deep transverse pit occupying the middle third of the base.

I found my specimens of *Ph. zebra* on the road from Sulaimaniah to Penjwin, a few miles from the former place (see p. 35).

36. **Pholidoptera satunini** (Uvarov).
(Figs. 9, S, and 10, S.)

N. W. Persia: Tohundil, Karadagh, 10.VI.1914 (von Wick; Leningrad Museum).

This species was known only from the Russian side of the Araxes

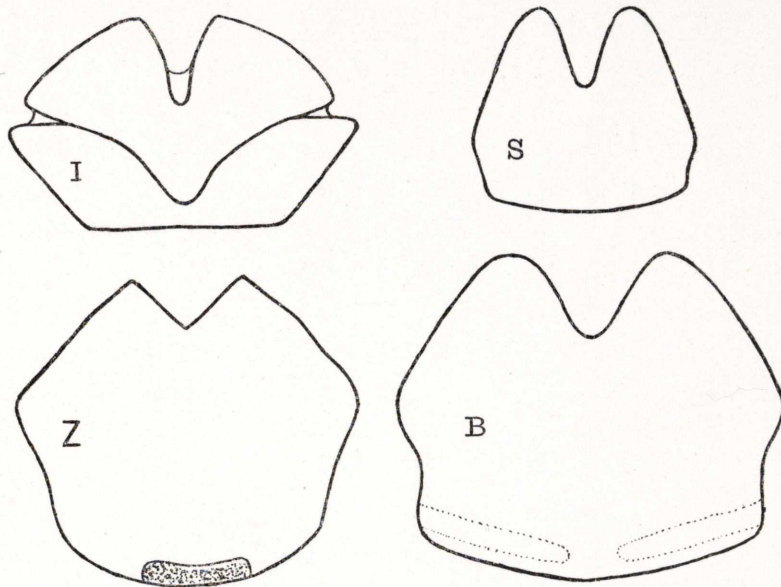


Fig. 10.—I, *Pholidoptera iraka* sp. n.; S, *Ph. satunini* Uv.; Z, *Ph. zebra* Uv.; B, *Ph. bakhtiara* sp. n. Female subgenital plate.

valley, but its occurrence in the Persian Karadagh range is quite natural.

The following supplementary description and the figures are based on topotypical specimens:

♂. Cercus long, almost straight, with a very small tooth placed at the middle.

♀. Subgenital plate relatively small, strongly incrassate, with thick narrowly rounded lobes.

Notes on the *satunini*-group of the genus *Pholidoptera*.

Ramme has recently discussed the group classification within the genus *Pholidoptera* (Mitt. Zool. Mus. Berlin, 16, 1930, p. 798), and he

placed *zebra* and *satunini* into a sub-group of the group including also *punctifrons* and *syriaca*. The two new species described above definitely belong with *zebra* and *satunini*, and all four should probably form a group of their own. Great differences in the genitalia of both sexes between these species leave no doubt as to their specific status, which is further confirmed by their occurrence partly in the same localities, partly in the same general region. There is, therefore, no reason to suspect any of them of being merely geographic forms of the same species. Indeed, it is surprising how stable are the characters of various *Pholidoptera* species, even when widely distributed. It appears that the genus consists of a very large number of perfectly defined species, each with firmly fixed specific characters in the structure of external genitalia, although there is often a very close superficial resemblance between species.

In connection with Ramme's suggestion that systematists should pay more attention to a phylogenetic point of view, I should like to stress that phylogenetic speculations are particularly dangerous, or at least futile, when dealing with a genus like *Pholidoptera*, in which the number of known species has been approximately doubled within the last twenty years, and practically every collection from the Eastern Mediterranean region and from Western Asia can be expected to yield further novelties. It must be not forgotten that enormously extensive and diversified areas of Asia Minor, of Kurdistan and of Northern and Western Persia remain unexplored by specialists in Orthoptera, and a general collector, however attentive he may be, can never attain the same results.

Gen. *Rammeola* nov.

Similar to *Bucephaloptera* in the general appearance, but more closely allied to *Pholidoptera*, from which it differs, in the female sex, in the shorter pronotum, overlapping elytra, the structure of terminal sternites, and the ovipositor curved under an angle.

♀. Face broad. Vertex very broad; its fastigium at the apex considerably broader than the first antennal segment. Pronotum short and broad, covering the head almost to the eyes; convex above, both transversely and longitudinally; median carina faintly perceptible

close to the hind margin, which is not at all produced, broadly rounded; lateral lobes hanging down obliquely, fully visible from above, their surface convex. Prosternum unarmed. Elytra strongly abbreviated, but their inner margins overlapping. Front tibia armed with

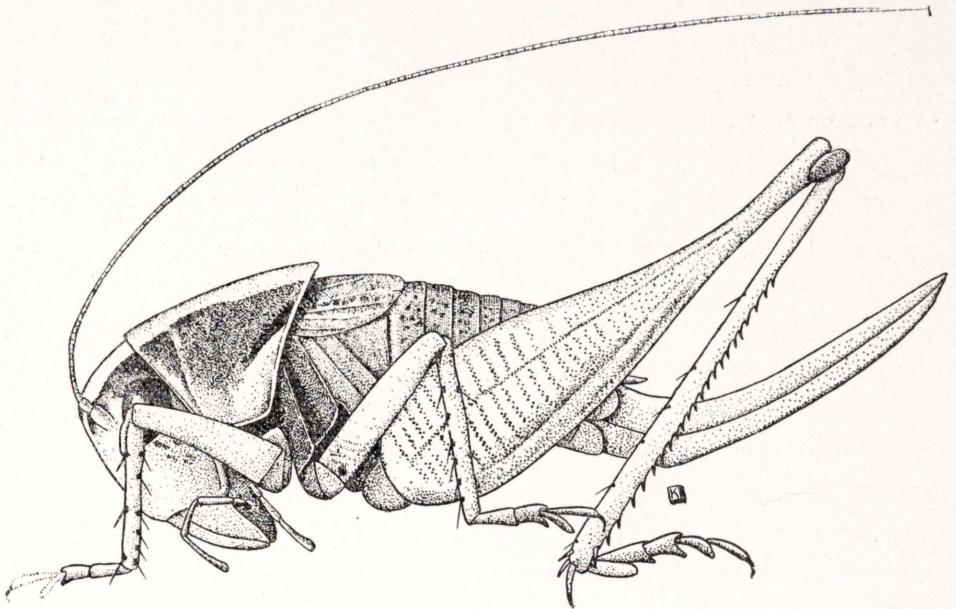


Fig. 11.—*Rammeola anatolica* gen. et sp. n.

three spines on the upper outer margin. All femora unarmed below. Hind tibia with two pairs of spurs below. Free plantula of hind tarsus equal to about two-thirds of the first tarsal joint.

37. ***Rammeola anatolica*** sp. n.

(Figs. 11 and 12.)

♀. Small, pale brownish-grey; two convergent spots on the vertex, the sides of the head above and behind the eyes, and the upper parts of the lateral pronotal lobes blackish-brown; front tibia marked with black near the base, between the auditory foramina; front and middle femur each with a small black spot at the base of the front surface; elytra reaching the third tergite, with blackish cells in the costal and apical parts; abdomen with some blackish dots, more dense on the sides.

Penultimate sternite inflated, with a strongly prominent, but rounded, longitudinal projection. Last sternite inflated anteriorly and excavate posteriorly on the sides of the thick median ridge. Subgenital plate with a deep triangular cavity, with a broad transverse quadrangular emargination behind. Ovipositor bent under an obtuse angle near its base, feebly recurved in the rest.

Length of body, 13.5; pronotum, 5; elytra, 2.8; hind femur, 13.5; ovipositor, 9 mm.

Anatolian plateau: Akchehir, I.-16.X.1931, 1 ♀ (Wagner). Type in the collection of Dr. C. Willemse, Egelshoven, Holland.

The resemblance of this curious insect to *Bucephaloptera bucephala* is very great, but entirely superficial, since the armature of the front tibiae is as in

Pholidoptera. There is, again, some similarity between our insect and *Pholidoptera griseoptera*, but the development of the elytra, even in the female sex, is considerably greater in *Rammeola*, and the male should be expected to possess elytra of a type very different from that in *Pholidoptera*. Moreover, the structure of the ovipositor and of the terminal sternites is very peculiar in the new genus.

It gives me a great pleasure to be able to dedicate this highly interesting new genus to Dr. Willy Ramme, who has added so much to our knowledge of Orthoptera, particularly of the Palaearctic Region.

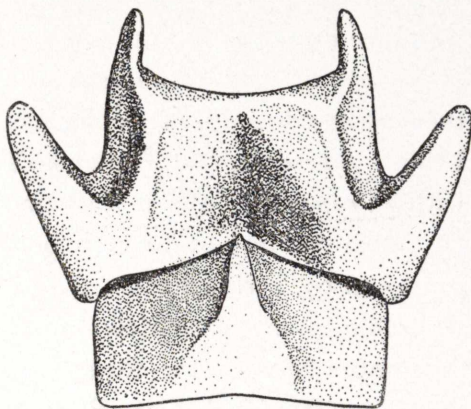


Fig. 12.—*Rammeola anatolica* gen. et sp. nov., last sternite and subgenital plate of female.

38. *Psorodonotus uvarovi* Ebner.

Armenia: Shebin-Karahissar (Sureya Bey).

This species was described by Ebner (Konowia, 1923, p. 249) from Kazikoporan in Russian Armenia, and I found it in Manglis, Tiflis province. Tarbinsky recently (Bull. Leningrad Inst. Control. Farm Forest Pests, 11, 1932, p. 196) synonymized it with *Pterolepis*

caucasicus Fischer-Waldheim, but this synonymy is very doubtfully correct. Fischer's description is quite insufficient to form a definite conclusion and his figure of the male, on which Tarbinsky mainly relies, is still less satisfactory. Moreover, Fischer described his insect from specimens collected by the botanist Steven, who never visited subalpine regions of the Lesser Caucasus where *P. uvarovi* occurs, while we do not know yet whether this last named species extends its range into the Great Caucasus; at any rate, it has never been found there although more collecting has been done there than in Armenia. I think, therefore, that Tarbinsky's action in synonymising *P. uvarovi* with *P. caucasicus* was at least premature.

I take this opportunity to point out that the genus *Semenovites* proposed by Tarbinsky (*l. c.*) for *Psorodonotus specularis* F. W. is separable from *Psorodonotus* only by purely relative characters. The differences between the Russian species of the two genera are fairly sharp, but the Balkanian *P. fieberi* represents a definite transition between them in the shape and the sculpturing of the pronotum.

39. **Metrioptera intermedia** (Serville).

Western Anatolia: between Tireh and Ephesus, 20.VII.1931.

Anatolian plateau: Mt. Kai-Dagh, N. of Ankara, about 4,000 ft., 10.-13.VIII.1931; Ankara, 12.VII.1931; Demirchi, S. of Simav, 3.-4.VIII.1931; between Ankara and Cheshme-Keupri on r. Kyzyl-Yrmak, 17.VIII.1931.

40. **Metrioptera affinis** (Fieber).

Western Anatolia: Urla, S. W. of Smyrna, 17.VII.1931; Bozdagh mts., Goelchik, 29.VII.1931; Menemen, Smyrna prov., 18.VII.1931.

41. **Metrioptera escalerae escalerae** (I. Bolívar).

S. Turkey: Urfa and environs, 1931 (Eshref Bey).

42. **Metrioptera tessellata** (Charpentier).

S. Turkey: Urfa and environs, 1931 (Eshref Bey).

The only male before me is of very slender habitus, with the elytra extending well beyond hind knees.

43. **Metrioptera vittata** (Charpentier).

Western Anatolia: Ali-Agha, N. of Menemen, 18.VII.1931; Tireh, 20.VII.1931; Bozdagh mts., Goelchik, 29.VII.1931.

Anatolian plateau: Demirchi, S. of Simav, 3.-4.VIII.1931.

44. **Metrioptera incerta** (Brunner Wattenwyl).

Anatolian plateau: Demirchi, S. of Simav, 3.-4.VIII.1931.

Ramme has recently established that *truncata* Wern., is a pure synonym of *incerta* Br. W. (Mitt. Zool. Mus. Berlin, 18. Bd., 1933, p. 424).

45. **Metrioptera elegans** sp. n.

(Fig. 13.)

Similar to *M. stricta* Zeller, but differing from it in relatively longer elytra and the structure of the female subgenital plate.

♀. The suture separating the frons from the fastigium of vertex equals the width of the first antennal joint. Pronotum with the disc flattened and even somewhat concave; median keel sharp in metazona and replaced by a pale line in prozona; lateral lobes forming right angles with the disc. Elytra very narrow; radial vein sends off a branch shortly beyond the middle; apex of elytra reaching the apical quarter of the hind femora. Hind femur strongly inflated basally, but very slender in more than the apical third.

Subgenital plate distinctly longer than broad, roof-shaped, faintly

carinate along the middle; hind margin with acutangular excision; lobes with the inner margin straight, outer margin convex, and the apex obtusely angulate. Ovipositor feebly and rather regularly

recurved, about three times as long as pronotum.

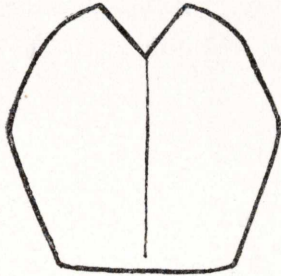


Fig. 13. — *Metrioptera elegans* sp. n. Subgenital plate of female.

Coloration and pattern as in *M. stricta* and other members of the group.

Length of body, 18; pronotum, 4; elytra, 18; distance between the base of radial branch and the apex of elytron, 9.5; width of elytron at the middle of radial branch, 2; hind femur, 19; ovipositor, 12 mm.

Anatolian plateau: Ankara, 3.VII.1931, 2 ♀♀ (Sureya Bey).

Metrioptera taurica described by I. Bolívar from the Bimbogha Dagh appears to be near this graceful new species, but differs from it in larger size, abbreviated elytra and in the female subgenital plate.

46. *Metrioptera brevipes* sp. n.

(Fig. 14.)

A brachypterous species remarkable for its very short, rounded pronotum, short and stout hind femora and the peculiar structure of the last sternite and the subgenital plate of the female.

♀. Fastigium of vertex very broad, about twice the width of the first antennal joint. Pronotum short, rounded above; median keel distinct only in the apical third; lateral keels completely absent. Length of elytra less than that of the pronotum.

Seventh sternite large, strongly inflated. Last sternite small, transverse, more than a half of its anterior part occupied by a shallow transverse depression; posterior margin with a thick low transverse swelling which rises in the middle into an obtuse conical tubercle. Subgenital plate trapezoidal, with a fine median sulcus, sides of which are slightly swollen, and with two sublateral depressions; hind margin obtusely excised; angles right. Ovipositor less than twice the

length of pronotum, strongly bent near the base, practically straight in the rest, strongly narrowed to the apex.

Coloration very pale brownish. Pronotum chocolate brown, with two pale lateral lines diverging both in front and behind; lateral lobes broadly margined with pale, but this border not sharply defined. Elytra brown, with pale crossveins. Hind femur with only a few brown spots above near the base. Ovipositor with a black streak only at the base above, uniformly brown elsewhere.

Length of body, 20; pronotum, 5.5; elytra, 3; hind femur, 14; ovipositor, 8.5 mm.

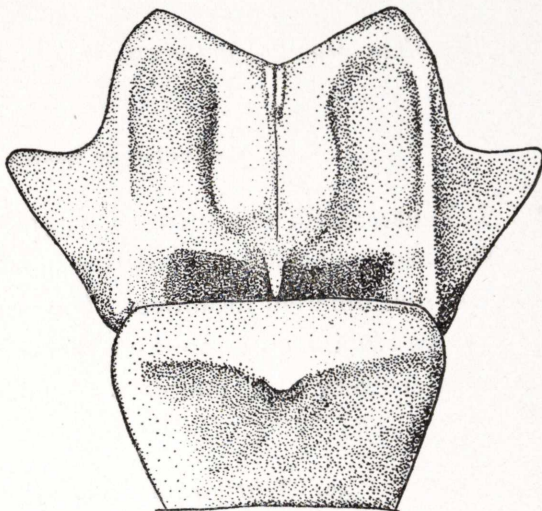


Fig. 14.—*Metrioptera brevipes* sp. n. Last sternite and subgenital plate female.

Western Anatolia: Ali-Agha, N. of Menemen, Smyrna prov., 18. VI.1931, 1 ♀.

Found in fairly dense grass on the slope of a hill near the sea shore.

47. ***Bucephaloptera bucephala*** (Brunner Wattenwyl).

Western Anatolia: Burnova nr. Smyrna, 15.VII.1931; Urla, S. W. of Smyrna, 17.VII.1931; Ali-Agha, N. of Menemen, 18.VII.1931; Tireh, 20.VII.1931; Demirchi, S. of Simav, about 3,000 ft., 3.-4.VIII.1931.

Very common and even numerous on slopes of hills with stunted spiny evergreen oaks, but exceedingly difficult to catch owing to its habit of diving into the thickest shrubs when disturbed.

Appears to be a purely Mediterranean insect, reaching its upper limit of distribution at about 3,000 ft. (Demirchi) where the steppe vegetation makes its appearance.

48. **Decticus albifrons** (Serville).

S. Turkey: Urfa and environs, 1931 (Eshref Bey).

S. W. Anatolia: Adalia prov., Osmanlye (Sureya Bey).

Anatolian plateau: between Ankara and Tuz-Goel, 14.VIII.1931.

49. **Medecticus assimilis** Fieber.

S. Turkey: Urfa and environs, 1931 (Eshref Bey).

There is a considerable variation in size between specimens of this species from different localities. The largest ones and with the longest wings are known to me from Persia, while a pair from the Adalia province are very small and dark coloured.

50. **Tettigonia viridissima** (Linnaeus).

Western Anatolia: Demirchi, S. of Simav, 3.4.VIII.1931.

51. **Bradyporus dilatatus** (Stål).

Anatolian plateau: Ankara (Sureya Bey).

This species is very common in the steppes round Ankara, and the penetrating stridulation of males can be heard early in the evening.

Stål described the species from «Asia Minor» and Brunner again described it from Amasia under the name *inflatus*, 1882. Both descriptions leave no doubt that they refer to this particular species, and the synonymy was correctly established by Krauss.

52. **Bradyporus latipes** (Stål).

Western Persia: Mallat-Abad, Iraq-Adzhemi, 6.V.1904 (*Zarudny*); Chagajor, Haut Karoum, VIII.1899 (*Escalera*); Demavend, 1927 (*Dzhalal Afshar*); Isfahan to Kum, 24.IV.1927, larvae (*Siazov*).

The specimens collected by Escalera have been labelled by Dr. Ignacio Bolívar as *Callimenus ferdinandi*, which is only a manuscript name; I thought it necessary to record the fact, since a certain

number of duplicates have been distributed to other museums under that name.

This species offers some local variations particularly in the size and coloration, but the external genitalia in both sexes are very characteristic and do not vary appreciably. It must be noted, however, that the side margins of the female subgenital plate tend to curl down in dry specimens, so that the posterior lateral angles become invisible and the plate appears rounded and more narrow apically than it really is.

53. ***Bradyporus macrogaster*** (Lefebvre).

Anatolian plateau: Demirchi, S. of Simav, 3.-4.VIII.1931.

My male specimens from Demirchi agree perfectly with a male in the British Museum from Smyrna, which is the type locality of *B. macrogaster* Lef. Fieber's description of *brachynotus* also agrees with my specimens and I consider the latter name a synonym.

Notes on species of *Bradyporus*.

An exact identification of any species of this genus, except *B. dasypus*, always presented practically unsurmountable difficulties, since the old descriptions are based almost entirely on colour characters and on variable structural features. In order to arrive at a reliable identification of the three above mentioned species, I had to attempt to clear up all known species. It soon became apparent that excellent specific characters can be found in the structure of the male cerci and particularly in that of the female subgenital plate; these characters have been only mentioned briefly by the previous authors, but never illustrated (except for Boldyrev's figures of *B. multituberculatus*, see below). The following notes do not constitute a revision of the genus, since I had neither time nor material necessary for a monographic work, but it is hoped that they will be of assistance for a future reviser.

Male cercus in all species studied by me is provided with a strong hook near the apex on the inner side, and with a small lobe-like appendage at the base. The outline of the whole cercus depends greatly on the angle of vision, and I found it most practicable to look at it from the ventral side; of course, the cercus must be dissected

out for the examination. The ventral aspect of the cercus affords the best characters for comparison with other species, because it is that side of cercus which comes into contact with the subgenital plate of the female during copulation. It must be stressed that the shape of the whole cercus, of its apex, hook and basal lobe are subject to considerable individual variations which, however, do not exceed certain specific limits. Identification of species from males alone can be scarcely recommended, since specific characters in the female subgenital plates are much more definite. These characters consist in the general shape of the plate, in the presence or absence of apical and lateral spines, and in the size and shape of the pair of pits found near the basal lateral angles. These pits, according to Boldyrev (Eos, iv, 1928, p. 31), play an important part during the process of copulation, since the male grips the female by inserting the hooks of the cerci into the pits. It is not surprising, therefore, that the form of the pits shows a close correlation with the shape of the male cercal hooks, and that both should provide good specific characters.

The following annotated list comprises all recognisable species, with their synonyms; the names which are not different, but

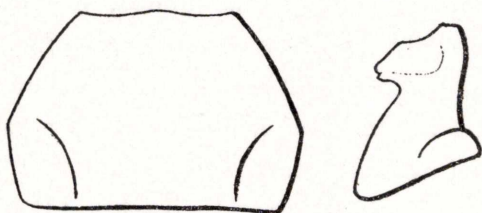


Fig. 15.—*Bradyporus latipes* Stål. Female subgenital plate and male cercus from below.

have been applied to wrong species, are not considered in the list.

1. *Bradyporus dasypus* (Illiger).

1800. *Locusta Dasypus* Illiger, Wiedeman Arch. Zool., 1 (2), p. 144.

The type of the genus. Well distinct from other known species, but the differences do not justify generic separation.

2. *Bradyporus latipes* (Stål).

(Fig. 15.)

1876. *Callimenus latipes* Stål, Bih. Svenska Akad., III (14), p. 42.

— *Callimenus ferdinandi* I. Bolivar (*in litt.*)

Female subgenital plate very broadly hexagonal; basal pits of moderate size, close to basal angles. Male cercus short; its apex

blunt, uneven; tooth blunt, with 2-3 indentations at the apex; basal lobe low and broad.

3. *Bradyporus dilatatus* (Stål).

(Fig. 16.)

1876. *Callimenus dilatatus* Stål, Bih. Svenska Akad., III (14), p. 42.

1882. *Callimenus inflatus* Brunner von Wattenwyl, Prodr. Europ. Orth., p. 253.

Female subgenital plate very large and broad, rounded behind; basal pits very large, not deep. Male cercus with rather promi-

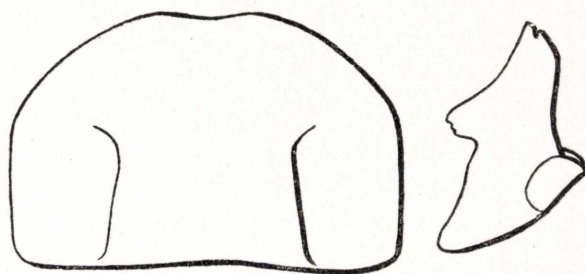


Fig. 16.—*Bradyporus dilatatus* St. Female subgenital plate and male cercus from below.

nent, bituberculate apex; tooth bidentate or tridentate; basal lobe oval, fairly large.

4. *Bradyporus montandoni* (Burr).

(Fig. 17.)

1898. *Callimenus montandoni* Burr, Trans. Ent. Soc. London, 1898, p. 51.

Female subgenital plate parabolic, much broader than long, with a shallow apical emargination; basal pits small, transverse. Male cercus with rounded apex; hook beak-like, subacute; basal lobe low, large.

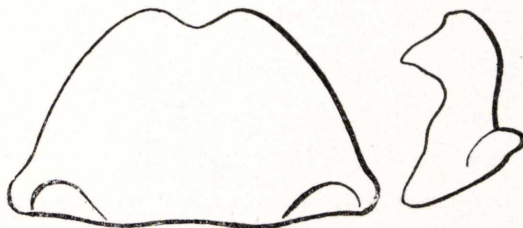


Fig. 17.—*Bradyporus montandoni* Burr. Female subgenital plate and male cercus from below.

5. *Bradyporus oniscus* (Burmeister).

(Fig. 18.)

1838. *Callimenus oniscus* Burmeister, Handb. Ent., p. 677.

The restriction of this name to the species occurring in Greece is based on the fact that Greece is the first country mentioned by



Fig. 18.—*Bradyporus oniscus* Burm. Female subgenital plate and male cercus from below.

Burmeister who says that the species occurs in Greece, Turkey and South Russia. He also quotes Charpentier (in litt.) who a year later described the species from Greece and Turkey, and the figure he gives agrees very well with the Greek specimens studied by me (from Athens, Epirus and Parnassus).

Female subgenital plate in this species is very large, rounded-triangular; basal pits quite small. Male cercus relatively long; apex blunt, rounded; hook very acute, beak-like; basal lobe very broad and low.

6. *Bradyporus macrogaster* (Lefebvre).

(Fig. 19.)

1831. *Ephippiger macrogaster* Lefebvre, Guérin, Magaz. Zool., 1 (2), Ins. pl. 5.

1853. *Callimenus oniscus* var. *brachynotus* Fieber, Lotos, III, p. 206.

1901. *Callimenus oniscus* var. *intermedia* Werner, Sitzber. Akad. Wiss. Wien, Mat. Nat. Cl., 110, p. 286.

The original description was based on specimens from the environs of Smyrna, and the type of Werner's var. *intermedia* was taken at Burnabad near Smyrna. Fieber's description is sufficiently exact to recognise the species. My redescription is based on specimens from Demirchi and Smyrna.

Female subgenital plate somewhat broader than long, strongly narrowed towards the apex which is truncate and bisinuate; apical angles very acute; lateral margin with a short spine before the middle; basal pits very large and shallow. Male cercus rather short; apex projecting, rounded-conical; hook short, blunt, obtusely bidentate; basal lobe small, dissected.

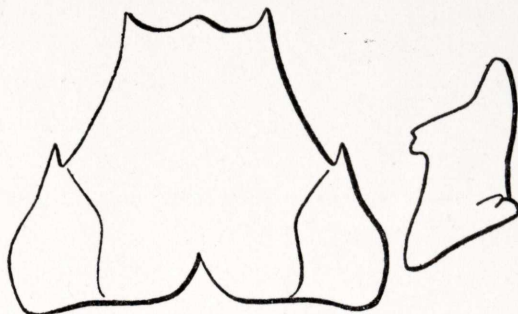


Fig. 19.—*Bradyporus macrogaster* Lef. Female subgenital plate and male cercus from below.

7. *Bradyporus longicollis* (Fieber).

(Fig. 20.)

1853. *Callimenus oniscus* var. *longicollis* Fieber, Lotos, III, p. 206.

1882. *Callimenus pancici* Brunner von Wattenwyl, Prodr. Europ. Orth., p. 252.

Although Fieber did not specify the typical country of *longicollis* Brunner says that he examined original specimens in the Fieber collection and they were from Turkey.

This must presumably mean Turkey in Europe and Brunner's own species was from Nish in Serbia. My knowledge of the species is based on the original co-types of Brunner's species.

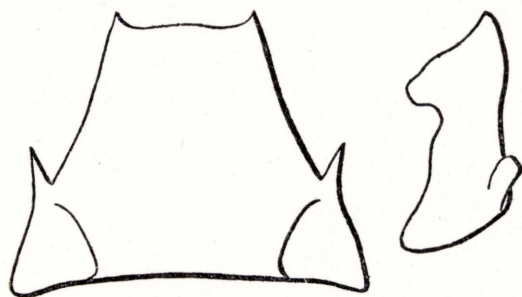


Fig. 20.—*Bradyporus longicollis* Fieb. Female subgenital plate and male cercus from below.

In this species female subgenital plate is very similar in the general shape to that in *B. macrogaster*, but the apex is broader and not so definitely bisinuate; lateral spines are longer and placed nearer to the base; basal pits are considerably smaller. Male cercus with the apex subacute; hook short, rounded truncate; basal lobe small, narrow and high.

The affinity between this species and *B. macrogaster* is very close,

but the characters enumerated above are sufficiently constant to warrant their specific separation.

8. *Bradyporus multituberculatus* (Fischer Waldheim).

1833. *Callimus multituberculatus* Fischer Waldheim, Bull. Soc. Imp. Nat. Moscou, vi, p. 374.

1906. *Callimenus brauneri* Shugurov, Rev. Russe Ent., vi, 1906, p. 176.

Full synonymy of this species was discussed by Boldyrev (Eos, iv, 1928, p. 14).

Although I have no specimens of this species before me at present, Boldyrev's description and figures make it clear that it is distinct from others.

Female subgenital plate (see Boldyrev, *l. c.*, p. 31, fig. 5) is broadly triangular, with the apex shallowly emarginate; apical angles not spinose; lateral spines short; basal pits rather small, round, shallow. Male cercus (Boldyrev, *l. c.*, p. 31, fig. 4) with the apex very blunt; hook acute; basal lobe large.

9. *Bradyporus dobrogensis* Müller.

1933. *Bradyporus longicollis* sbsp. *dobrogensis* Müller.

This insect is not known to me in nature, but my colleague Herr A. Müller has compared my sketches of the female subgenital plate of *B. montandoni* and *B. longicollis* with his specimens from Walachia and from the Southern Dobrudja. The result was that his records of *B. longicollis* from Walachia and Northern Dobrudja should be referred to *B. montandoni*, while the insect of Southern Dobrudja appears to represent a distinct species closely allied to *B. longicollis*.

The female subgenital plate in *B. dobrogensis* is built on the same type as in *B. longicollis*, but its apex is rounded-truncate and not armed with a pair of short spines. The male cercus (fig. 1 of Müller's work) seems to be more straight than in *B. longicollis* and with the apex of the inner tooth divided in two.

It is not impossible that Müller is right in suggesting that *dobro-*

gensis represents only a subspecies of *longicollis*, but more material is necessary to confirm that suggestion, and in the meantime it is preferable to treat *dobrogensis* as an independent species.

Apart from the above nine species of the genus, there are four more names to be discussed.

One is *Callimenus obesus* Fischer Waldheim (Notice sur le Tettigopsis, 1830, p. 14) which is definitely a *nomen nudum* for the species described later (1833) by the same author under the name *multituberculatus*.

Another is *Gryllus Tettigonia Nympha* Stoll (Spectres, Saut., etc., 1813, p. 24, pl. IIa, fig. 44). This name is applied on the same page of the index to a number of wingless species and is obviously not meant as a specific name; moreover, if it were specific, it is made invalid, being preoccupied several times in the index.

The remaining two species are, unfortunately, no so easily disposed of. One of them is *Locusta armadillo* Thunberg (Mem. Acad. Sci. St. Petersb., v, 1815, p. 284), which is described in a few practically meaningless words, without an indication of the locality. The second is *Callimus restrictus* Fischer Waldheim (Bull. Soc. Nat. Mosc., vi, 1833, p. 375; Orth. Imp. Ross., 1846, p. 219, pl. 7, fig. 3), which appears to have been based on a larva. The type was taken by Pallas «au midi de Russie» and it is almost certain that it belonged to *B. multituberculatus*, in which case *restrictus* should be regarded as a synonym. However, no one has recently studied specimens from the Ukraine, where *Bradyporus* is known to have occurred in the last century and may still not be completely extinct in some isolated localities not yet touched by cultivation, which spells the doom of these remarkable insects (see Boldyrev, *l. c.*, p. 53).

ACRIDIDAE

54. *Acrida turrita turrita* (Linnaeus).

Anatolian plateau: between Ankara and Tuz-Goel, 14.VIII.1931; Akchehir, I.IX.-16.X.1931 (Wagner).

55. **Acridella robusta** (Uvarov).

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

56. **Duroniella fracta** (Krauss).

Western Anatolia: between Tireh and Ephesus, 20.VII.1931.

This species can be readily distinguished from others of the same genus by its considerably larger size and robust habitus.

57. **Duroniella laticornis** (Krauss).

Kurdistan: between Kirkuk and Penjwin, 28.V.1932.

Previously known only from Palestine.

58. **Stenobothrus nigromaculatus** (Herrich-Schaeffer) sbsp. ?

Northern Anatolia: Ilkaz-Dagh, N. of Ankara, about 6,500 ft., 13.VIII.1931.

There is no doubt that the specimens before me should be referred to *nigromaculatus*, as that species is commonly understood at present. I believe, however, that at least three well distinct subspecies (or, perhaps, species) of *nigromaculatus* should be differentiated even amongst European material. Thus, insects from Berlin have relatively long antennae, black hind knees, red abdomen and red hind tibiae, while in those from Vienna the antennae are short, hind knees not black, abdomen and hind tibiae dirty-yellow. These two forms may represent two subspecies, and a third one was described by Krauss from Istria under the name var. *istriana*, differing in the larger size, very long antennae and the coloration very contrasted, as in the Berlin form. Unfortunately, the original description of *nigromaculatus* does not refer to any of the above characters, and it is impossible to decide to which form the specific name should be restricted, until a through revision of an abundant European material is carried out.

The specimens from the alpine region of the Ilkaz-Dagh are very close to the Vienna form as characterised above and should be pro-

bably referred to it. On the other hand, they show a great resemblance to *St. transcausicus* recently described by Ramme from the Lesser Caucasus and representing, in my opinion, a subspecies of *nigromaculatus*. They differ from *transcausicus* particularly in the relative width of the scapular and the next (externo-median) area of elytra. In *transcausicus* both areas are equally narrow, while in all forms of *nigromaculatus* the externomedian area is slightly expanded and appears definitely broader than the scapular.

59. ***Stenobothrus zubowskyi*** I. Bolívar.

(Fig. 21.)

Anatolian plateau: Ankara, 1930 (Sureya Bey); between Ankara and Changri, 10.-VIII.31; mt. Kai-Dagh, N. of Ankara, about 4,000 ft., 10.-13.VIII.31; Beychehir, 1.VII.1930 (Sureya Bey); Sivas (Berlin Museum); Erzerum (Berlin Museum).

Owing to the kindness of Professor Ignacio Bolívar I had the opportunity to study the types of this relatively little known species,

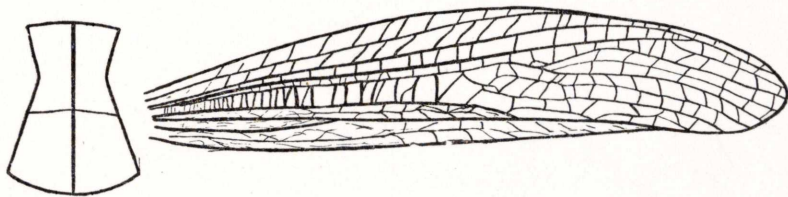


Fig. 21.—*Stenobothrus zubowskyi* I. Bol. Pronotal disc and elytron of the male type.

and I think it useful to reproduce here sketches of its wing-venation and the pronotal disc.

The types are from Yenidzhe-Kale, and my specimens from more northern areas somewhat differ from them in the smaller size and less strongly inflexed pronotal keels. The differences, however, are insufficiently pronounced and constant to be regarded of subspecific value.

St. zubowskyi is closely allied to two European species, namely, *St. nigrogeniculatus* Krauss, and *St. miramae* Dirsch (Bol. Soc. Esp. Hist. Nat., xxxi, 1931, p. 711), but differs from both in the shape of pronotal keels, which are in them only very feebly incurved. The

following preliminary key (based on paratypes) may serve to separate the three species:

- 1 (2). Pronotal keels inflexed under an obtuse angle at the middle of the prozona. Second radial vein practically straight; interulnar area about half the width of the discoidal **St. zubowskyi** I. Bol.
- 2 (1). Pronotal keels very slightly bow-shaped.
- 3 (4). Second radial vein practically straight; discoidal area with widely distant, not incrassate, veinlets; interulnar area a little less than half the width of the discoidal **St. miramae** Dirsch.
- 4 (3). Second radial vein incrassate, distinctly s-shaped; discoidal area with dense incrassate veinlets; interulnar area very narrow, not more than one third of the discoidal **St. nigrogeniculatus** Kr.

60. **Stenobothrus nigrogeniculatus** Krauss.

Anatolian plateau: Chebin-Karahissar; Ankara; Orhaneli; Buladou (all from Sureya Bey collection); Goelchik, Bozdagh mts., Smyrna prov., 29.VII.1931.

This species has been always considered a synonym of *St. fischeri* Eversmann, but the latter species was recently redescribed by Dirsch (Bol. Soc. Esp. Hist. Nat., xxxi, 1931, p. 713) and there can be no doubt that *nigrogeniculatus* is well distinct from it. The main difference consists in the presence of a narrow interulnar area in *nigrogeniculatus*, while in *fischeri* the ulnar veins are fused. Differences of *nigrogeniculatus* from the Crimean *miramae* can be seen in the above key.

61. **Stenobothrus fischeri** (Eversmann).

Anatolian plateau: Ankara, 24.VI.1930; 19.VI.1931 (Sureya Bey); Beychehir, 1.VII.1930 (Sureya Bey); between Ankara and Changri, 10.VIII.1931; Ilkaz-Dagh, N. of Ankara, 6,500 ft., 12.VIII.1931; Ushak (Berlin Museum).

The Anatolian specimens do not differ from the typical ones of Eastern European Russia and agree with the re-description of the type given by Dirsch (*l. c.*)

62. **Stenobothrus lineatus** (Panzer).

Northern Anatolia: Ilkaz-Dagh, N. of Ankara, about 6,500 ft., 12.VIII.1931.

63. **Myrmeleotettix maculatus** (Thunberg).

Northern Anatolia: Ilkaz-Dagh, N. of Ankara, 6,500 ft., 12.VIII.1931.

The only previous record for Asia Minor was from the Bythinian Olympus (Werner).

64. **Omocestus ventralis** (Zetterstedt).

Northern Anatolia: Samsun, 25.V.1930; Yalva, 25.VII.1930; Orhan Ili, 10.VI.1930 (Sureya Bey).

65. **Omocestus petraeus** (Brisout).

1930. *Omocestus tesquorum* Tarbinsky, Konowia, ix, p. 184 (*syn. nov.*)

Western Anatolia: between Salihli and Borlu, Manisa prov., 2.VIII.1931.

Anatolian plateau: Akchehir, 1.-16.IX.31 (Wagner), Ankara, 10.-15.VIII.1931; between Ankara and Changri, 10.VIII.1931; between Ankara and Cheshme-Keupri on r. Kyzyl-Yrmak.

Tarbinsky, in his description of *O. tesquorum* points out its close similarity to *O. petraeus*, but does not indicate a single differential character. A careful comparison of paratypes of *O. tesquorum* with the topotypes (from Lardy, near Paris) of *O. petraeus*, kindly sent me by Dr. Chopard, enabled me to establish their identity beyond any doubt.

66. **Omocestus nanus** sp. n.

(Fig. 22.)

Similar and allied to *O. minutissimus* I. Bolívar, from Spain, but more slender and differing in the shape of pronotal keels and the venation of elytra.

♂ (*type*). Antennae longer than head and pronotum together, relatively stout, somewhat flattened, slightly thickened in the apical fifth part, tapering apically.

Head longer and thicker than pronotum, moderately projecting above it. Face strongly oblique. Frontal ridge broad, gradually and feebly dilated from the fastigium down to clypeus; surface smooth, concave only at the fastigium and some distance below it; margins straight, very obtuse. Lateral facial keels obtuse, regularly curved. Fastigium of vertex horizontal, parabolic, a little broader than long, feebly concave. Fastigial foveolae about twice as long as broad, narrowed apically, moderately concave, with obtuse margins.

Pronotum narrower than in *O. minutissimus*. Disc weakly tectiform; median carina thick, moderately raised, cut by the third

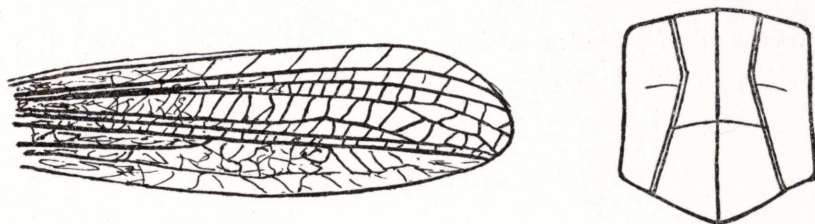


Fig. 22.—*Omocestus nanus* sp. n. Elytron and pronotal disc of the male.

sulcus behind the middle. Posterior angle of the disc obtuse, not rounded. Lateral carinae thick, callous, inflexed under an obtuse angle at the middle of prozona, straight and moderately divergent both forwards and backwards from the inflexion. Lateral lobes deeper than long, a little narrower below than above; front lower angle obtuse, broadly rounded; lower margin obtusely angulate behind the middle; hind lower angle obtuse, not rounded.

Elytra reaching the seventh tergite, narrow, their greatest width at about four fifths of their length; anterior margin straight; posterior margin very feebly convex; apex elliptical. Costal area narrow, extending to the apical fifth of the margin; scapular area reaching nearly to the apex, expanded apically, with faintly visible sparse oblique veinlets; first and second radial veins straight, the second incrassate; the field between them almost parallel-sided; third radial weak, irregular, ending in the apex of the elytron; discoidal field open, with large cells, separated by weak irregular veinlets; first ulnar

vein incrassate, straight; interulnar field narrow, sparsely veined; anal field broad. Wings rudimentary, not reaching the middle of elytra.

Tympanum with a narrow slit-like opening. Last tergite rounded-excised in the middle; angles of the excision obtuse, slightly incrassate. Anal plate rounded-triangular, with the sides practically straight; the surface broadly convex along the middle, with a shallow median groove. Cercus short and stout, strongly compressed laterally. Subgenital plate short, rounded.

General coloration very pale buff, with castaneous and blackish markings forming the usual pattern on the head and pronotum. Elytra without spots. Hind femur on the inside with a blackish submedian streak in the basal half, and indefinite dark fasciae near the upper margin; upper and outer side with the fasciae just indicated near the upper margins. Sides of abdominal tergites with oblique castaneous streaks.

♀ (*paratype*). Antennae shorter than head and pronotum together. Frontal ridge convex, with a small depression under the ocellum. Elytra reaching the apex of the second tergite, very narrow, not overlapping each other on the back. Ovipositor nearly concealed under the large upper genital valves.

Length of body ♂, 11; ♀, 14; pronotum ♂, 2.5, ♀, 3; elytra ♂, 5, ♀, 3.5; hind femur ♂, 7.5, ♀, 8.5 mm.

Anatolian plateau: between Ankara and Tuz-Goel, 14.VIII.1931, 25 ♂♂, 40 ♀♀; between Ankara and Cheshme-Keupri on the river Kyzyl-Yrmak, 17.VIII.1931, 3 ♂♂, 5 ♀♀.

There is some variation in the colour of paratypes, some being darker, with the pale lateral pronotal keels more conspicuous, but otherwise the series is very uniform.

O. nanus was quite common in the *Artemisia* steppe south and south-east of Ankara, occurring together with the preceding species and with *Sureyaella bella* (see p. 33), but the insects are not easy to catch, since they make very long jumps and often escape from the net.

67. *Chorthippus apricarius* (Linnaeus).

Northern Anatolia: Ilkaz-Dagh, N. of Ankara, about 6,500 ft., 12.VIII.1931.

Collected on alpine meadows.

All specimens have short elytra reaching in the male only to the apex of hind knees, in the female to their base.

68. **Chorthippus vagans** (Eversmann).

Western Anatolia: Tireh, 20.VII.1931; between Salihli and Borlu, Manisa prov., 2.VIII.1931; Demirchi, S. of Simav, about 3,000 ft., 3.-4.VIII.1931.

Not previously recorded from Asia Minor.

69. **Chorthippus ilkazi** sp. n.

(Fig. 23.)

Allied to *Ch. daimei* Azam and *Ch. hirtus* Uvarov, but differing from both mainly in the venation.

♂ (*type*). Antennae stout, slightly flattened, about half again as long as head and pronotum together.

Head a little thicker than pronotum. Face moderately oblique. Frontal ridge punctured, sulcate from the base of antennae down-

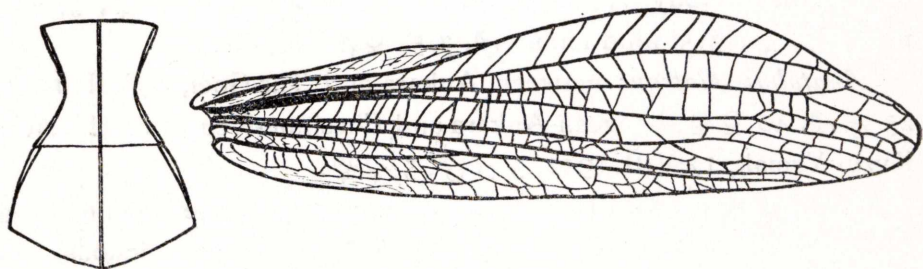


Fig. 23.—*Chorthippus ilkazi* sp. n. Pronotal disc and elytron of the male.

wards; margins obtuse, straight, feebly divergent downwards. Fastigium of vertex practically horizontal, pentagonal; apical angle a little less than 90° , its margins straight; surface feebly concave, with a distinct bow-shaped transverse furrow. Foveolae of vertex a little more than twice as long as broad, slightly curved, moderately concave; margins smooth, rounded.

Disc of the pronotum obtusely tectiform; front margin rounded; hind margin forming a very obtuse rounded angle. Median carina

linear, cut by the typical sulcus in the middle. Lateral keels distinct, callous, particularly in metazona; they converge from the front margin to the first sulcus, are obsolescent between the first and the second sulcus, and diverge behind the second.

Elytra reaching the apex of abdomen and the base of the hind knees, expanded, with the apex distinctly attenuate. Mediastinal field extending scarcely beyond the basal third, moderately expanded, without a false vein; mediastinal vein sinuate. Scapular field parallel-sided in more than basal third, then strongly dilated, with regular oblique veinlets. Interradial field dilated, with regular veinlets; cells higher than long; first radial vein straight except near the apex; second radial vein practically straight throughout. Discoidal field parallel-sided, regularly reticulated. Interulnar field distinctly narrower than the discoidal. Wings as long as elytra.

Subgenital plate short, obtuse. Cerci short, stout, compressed laterally.

Body and legs, particularly on the underside, with fairly long and dense hairs.

Coloration dirty brown. Pronotal keels buff, surrounded with brownish-black. Elytra with a few dark spots. Hind femur with black dots along the outer carinae and two indistinct dark fasciae. Hind tibia faintly reddish.

♀ (*paratype*). Antennae not longer than head and pronotum. Frontal ridge shallowly sulcate from the ocellum downwards, with very obtuse margins. Fastigium of vertex strongly transverse, broadly parabolic. Elytra not quite reaching the apex of abdomen and of the hind knees; mediastinal field extending to the base of the apical quarter, with a false vein; scapular field distinctly expanded; discoidal area more than twice the width of the interulnar area, with a double row of cells. Valvae of the ovipositor short, stout, unarmed. Coloration brownish-grey, with sharply defined black, castaneous and pale-buff markings; elytra with numerous dark spots and streaks, with a pale stripe in the scapular area. (One female paratype is dark green on the head and thorax; some are almost uniformly brown.)

Length of body ♂, 13.5; ♀, 20; pronotum ♂, 3.5; ♀, 4.5; elytra ♂, 10; ♀, 12.5; hind femur ♂, 7; ♀, 11 mm.

Northern Anatolia: Ilkaz-Dagh, N. of Ankara, about 6,500 ft., 12.

VIII.1931, 63 ♂♂ (including the type), 21 ♀♀; mt. Kai-Dagh, N. of Ankara, about 4,000 ft., 10.-13.VIII.1931, 1 ♂; between Ankara and Changri, 10.VIII.1931, 4 ♂♂.

This new species shows close affinity to *daimei* known from the Alps, and to *hirtus* described by me from mountains in Daghestan (Ann. Mag. Nat. Hist., ser. 9, xx, 1927, p. 192). It differs from *daimei* by the frontal ridge not constricted at the ocellum, by more expanded elytra and by the knees not being black. Differences from *hirtus* consist in the less sulcate frontal ridge, horizontal and less acute fastigium of vertex and the attenuate apex of elytra.

Ch. ilkazi was very numerous on the alpine meadows of the Ilkaz-Dagh, immediately above the police post, and a few specimens were caught at lower altitudes.

70. ***Chorthippus bozdaghi* sp. n.**

(Fig. 24.)

Closely related to the preceding species, but differing from it in the feebly inflexed pronotal keels and more abbreviated elytra, with the interradiat field considerably less expanded.

♂. Antennae less than half again as long as head and pronotum together, stout, somewhat compressed.

Fastigium of vertex broadly parabolic, about as long as broad. Typical sulcus of the pronotum distinctly behind the middle; lateral

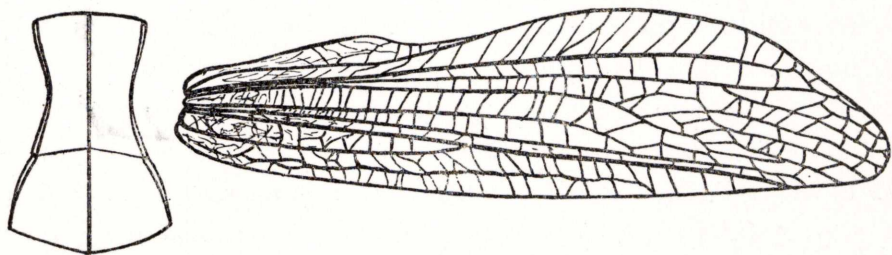


Fig. 24.—*Chorthippus bozdaghi* sp. n. Pronotal disc and elytron of the male.

keels weakly rounded-inflexed at the middle of prozona. Elytra just reaching the base of supra-anal plate and the apical third of hind femur; interradiat field less than half the width of the scapular, with the cells much longer than high. Other characters as in *Ch. ilkazi*.

Length of body, 16; pronotum, 4; elytra, 10; hind femur, 9.5 mm.

Western Anatolia: Goelchik, Bozdagh mts., Smyrna prov., 29.VII.

1931, 1 ♂.

71. **Chorthippus dorsatus loratus** (Eversmann).

Western Anatolia: between Tireh and Ephesus, 20.VII.1931; between Salihli and Borlu, Manisa prov., 2.VIII.1931.

Anatolian plateau: Mt. Kai-Dagh, N. of Ankara, about 4,000 ft., 10.-13.VIII.1931; between Ankara and Cheshme-Keupri on r. Kyzyl-Yrmak, 17-VIII.1931.

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

Kurdistan: between Sulaymaniah and Penjwin, 28.V.1932.

The specimens from Kai-Dagh are smaller than the others and represent a transition to the small European *Ch. dorsatus dorsatus*. Two males from Kurdistan are large, but very slender and may possibly represent another subspecies, but more material is necessary.

72. **Chorthippus parallelus tenuis** (Brullé).

1832. *Podisma tenuis* Brullé, Exped. Sc. Morée, Ins., p. 96, pl. XXX, fig. 7.

1832. *Podisma dimidiata* Brullé, l. c., p. 96, pl. XXX, fig. 8.

Western Anatolia: Urla, SW. of Smyrna, 17.VII.1931; between Tireh and Ephesus, 20.VII.1931; Goelchik, Bozdagh mts., Smyrna prov., 29.VII.1931.

A long series of specimens before me cannot be identified with the common European form of the species, because of their very large size, their measurements being, as follows: length of body ♂, 21; ♀, 29; pronotum ♂, 4.5; ♀, 5.5; elytra ♂, 13; ♀, 9; hind femur ♂, 11.5; ♀, 14 mm. Hind knees in the Anatolian specimens are very strongly marked in black; the male subgenital plate is conspicuously red. This is undoubtedly the form described by Brullé from Morea as *Podisma tenuis* (male) and *P. dimidiata* (female); these two names have always been regarded as synonyms of *parallelus*, and

must be applied to its large Southern subspecies. This subspecies was already tentatively separated by Brunner (Prodromus, p. 127), but he called it simply var. 2, without attaching a name to it.

In the general appearance *Ch. parallelus tenuis* resembles closely the Central Asian *Ch. turanicus* Tarb., but differs in the venation of male elytra, shape of pronotal keels and the lower valvae of the ovipositor provided with a strong tooth.

My specimens from Goelchik, in the Bozdagh mts., are slightly smaller than those from Urla and Ephesus (both at the sea-level), but still considerably larger than the European subspecies.

73. **Chorthippus parallelus parallelus** (Zetterstedt).

Anatolian plateau: Ankara (Sureya Bey).

The specimens from Ankara do not differ in their size from the European ones and are strikingly dissimilar from those of Western Anatolia.

74. **Stauroderus scalaris** (Fischer-Waldheim).

Northern Anatolia: Ilkaz-Dagh, N. of Ankara, about 6,500 ft., 12. VIII. 1931.

Collected on the alpine meadows.

The Anatolian specimens are paler and somewhat smaller than European, with slightly shorter antennae and less expanded elytra which in the male do not bear a black subapical spot. These characters may be of subspecific value, but it is wiser to defer the description of the subspecies until a revision is undertaken.

I agree with Bey-Bienko (Izv. Zap.-Sibirsk. Geogr. Obshtsh., VII, 1930) in restricting the genus *Stauroderus* to this one species.

75. **Dasyhippus escalerae** (I. Bolívar).

Anatolian plateau: Ankara, 12.VII.1931.

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

An early species, which I found at Ankara fully adult in July, but none were to be seen a month later.

76. **Euchorthippus pulvinatus** (Fischer-Waldheim).

Anatolian plateau: Ankara, 10.VIII.1931.

77. **Notostaurus anaticus** (Krauss).

Western Anatolia: Tireh, 20.VII.1931.

Anatolian plateau: Demirchi, S. of Simav, about 3,000 ft., 3.-4.VIII.1931.

S. Turkey: Urfa and environs, VII.1931 (Eschref Bey).

The genus *Notostaurus* has been recently established by Bey-Bienko for the species of *Dociostaurus* with an occipital carina (see Bol. Soc. Esp. Hist. Nat., xxxiii, 1933, p. 337).

78. **Dociostaurus brevicollis** (Eversmann).

Western Anatolia: between Tireh and Ephesus, 20.VII.1931.

Anatolian plateau: between Ankara and Changri, 10.VIII.1931; between Ankara and Cheshme-Keupri on r. Kyzyl-Yrmak, 17.VIII.1931; mt. Kai-Dagh, N. of Ankara, about 4,000 ft., 10.-13.VIII.1931.

79. **Dociostaurus genei** (Ocskay).

N. Syria: East of Aleppo, 11.VI.1932.

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

80. **Dociostaurus hauensteini** (I. Bolívar).

Anatolian plateau: between Ankara and Tuz-Goel, 14.VIII.1931.

Kurdistan: between Kirkuk and Penjwin, 28.V.1932.

The specimens from Kurdistan are considerably larger in absolute dimensions than the typical form and approach in that respect *D. kurdus* Uv., but differ from it in morphological characters.

81. ***Dociostaurus maroccanus*** (Thunberg) ph. **solitaria**.

Western Anatolia: Menemen, Smyrna prov., 18.VII.1931; Tireh, 20.VII.1931; Habiblar in the mts. S. of Tireh, 21.VII.1931; Goelchik, Bozdagh mts., 29.VII.1931; Demirchi, S. of Simav, 3.-4.VIII.1931.

Palestine: Road from Jerusalem to Jericho, km. 22, 13.V.1932.

81a. ***Dociostaurus maroccanus*** (Thunberg) ph. **gregaria**.

Kurdistan: Khanaqin, 26.V.1932; between Kirkuk and Sulaymaniah, 28.V.1932.

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

The distribution and ecology of the Moroccan locust in Western Anatolia have been fully dealt with in my special paper on the subject (Bull. Entom. Research, vol. 23, 1932, p. 273) and the Iraquo-Syrian area is discussed in another paper (*l. c.*, vol. 24, 1933, p. 407). The solitary phase of this locust has recently been described in some detail by Tarbinsky (Bull. Leningrad Inst. Contr. Farm and Forest Pests, No. 3, 1932, pp. 303-320).

82. ***Arcyptera labiata*** (Brullé).

I have now studied the type of this species described by Brullé from Morea, kindly brought from Paris by Dr. Chopard. It is a female, with the following measurements: length of body 40 (somewhat distended); pronotum, 8.8; elytra, 12; hind femur, 22 mm.

Hind femur with faint bands (perhaps discoloured); knees black laterally, but the knee-lobe pale. Elytron reaches beyond the edge of second tergite.

Anatolian specimens do not differ in any essential characters from the type.

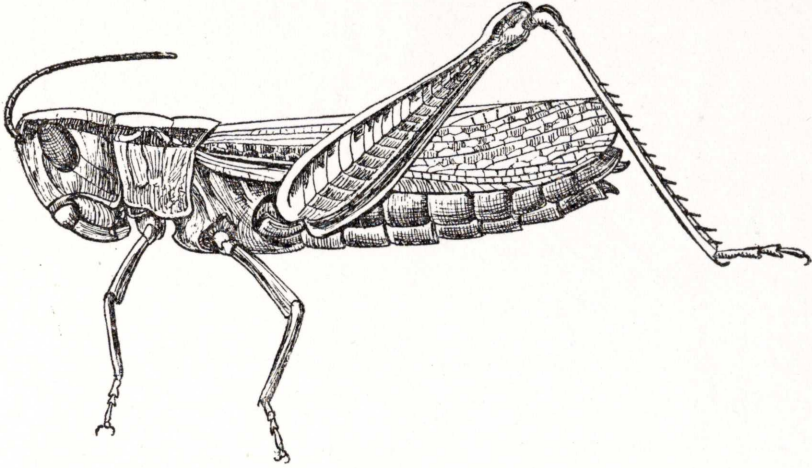
83. ***Ramburiella truchmana*** (Fischer-Waldheim).

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

84. *Ramburiella bolivari* (Kuthy).

(Fig. 25.)

Anatolian plateau: between Ankara and Changri, 10.VIII.1931; between Ankara and Tuz-Goel, 14.VIII.1931; between Ankara and Cheshme-Keupri on r. Kyzyl-Yrmak, 17.VIII.1931.

Fig. 25.—*Ramburiella bolivari* (Kuthy), ♀.

This interesting species was fairly common in the dry semi-deserts with *Artemisia*.

85. *Eremippus gracilis* sp. n.

(Figs. 26, G, and 27, G.)

Closely allied to *E. simplex* (Eversmann), from which it differs in the more slender habitus; much more narrow and acute fastigium of vertex; temporal foveolae well visible from above; relatively longer antennae and elytra.

♂ (*type*). Antennae nearly twice as long as head and pronotum together; median joints more than twice as long as broad. Head ascending, with the face oblique, but the fastigium in profile forming an arch with the frontal ridge. Frontal ridge practically straight in profile, sulcate up to a point above the base of antennae, but the sulcus not visible from above. Fastigium of vertex acutely pentago-

nal, about half again as long as broad; surface concave. Foveolae well visible from above, narrowed in front.

Pronotum elongate, obtusely tectiform above. Median carina low, but well distinct throughout. Lateral carinae well distinct throughout, rounded inflexed in the second third of the prozona, strongly

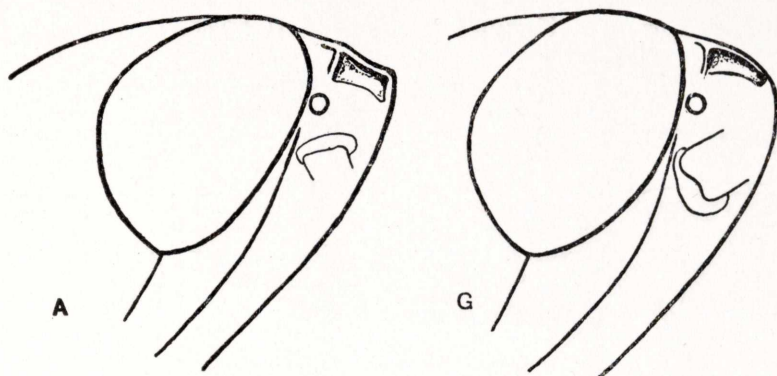


Fig. 26.—Head of the male of *Eremippus angulatus* sp. n. (A) and *E. gracilis* sp. n. (G).

divergent and bent outwardly in metazona. Posterior margin strongly prominent, rounded.

Elytra narrow, extending well beyond hind knees. Scapular area strongly expanded, three times as broad as the externomedian.

General coloration ochraceous-brown, with indefinite brownish and greyish dots and streaks. Lateral pronotal carinae margined with brown.

♀ (*paratype*). Antennae distinctly longer than head and pronotum together; median joints twice as long as broad. Fastigium of vertex a little longer than broad. Valvae of the ovipositor feebly excised.

Length of body, ♂ 11.5, ♀ 16.5; pronotum, ♂ 3, ♀ 4; elytra, ♂ 11, ♀ 12.5; hind femur, ♂ 7, ♀ 9 mm.

Anatolian plateau: between Ankara and Changri, 10.VIII.1931, 6 ♂♂, 2 ♀♀.

Found sparsely in a semi-desert with *Artemisia*.

86. *Eremippus angulatus* sp. n.

(Figs. 26, A, and 27, A.)

Differs well from the known species by the angular profile of the fastigium and by the expanded externomedian area of elytra.

♂ (*type*). Antennae a little longer than head and pronotum together; median joints about twice as long as broad.

Head strongly ascending. Face very oblique, forming a distinct angle with the vertex. Fastigium of vertex more than half again as long as broad, acutely pentagonal; surface concave; margins raised, with the apical and the lateral angles slightly projecting upwards

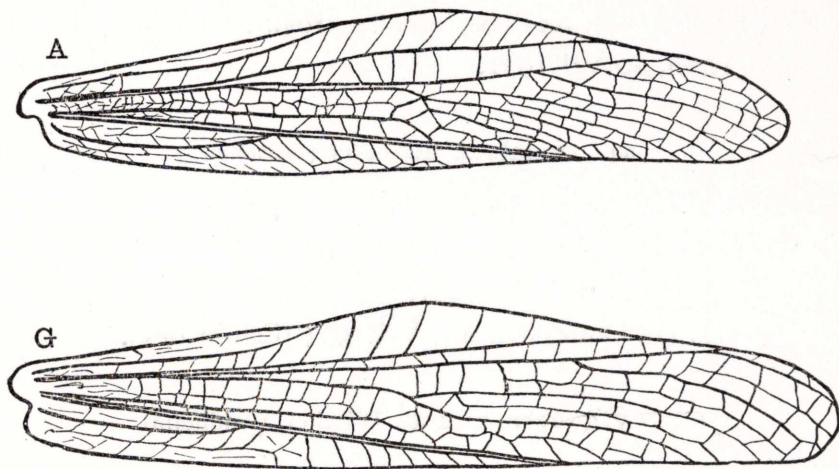


Fig. 27.—Male elytron of *Eremippus angulatus* sp. n. (A) and *E. gracilis* sp. n. (G).

when viewed in profile. Temporal foveolae deep, little narrowed in front, with the lower margin distinctly curved.

Pronotum as in *E. gracilis*.

Elytra relatively broad, reaching just beyond hind knees. Scapular area little expanded. Externomedian area expanded, only a little narrower than the scapular.

General coloration dirty-buff. Pronotum with brown markings alongside lateral carinae.

Length of body, 12; pronotum, 3; elytra, 10.5; hind femur, 6 mm.

Anatolian plateau: Tuz-Goel, 14.VIII.1931, 1 ♂, 1 larva.

The only two specimens were taken in an *Artemisia* semi-desert at the north-eastern extremity of the lake Tuz-Goel.

87. **Paracinema tricolor** (Thunberg).

Anatolian plateau: between Ankara and Cheshme-Keupri on r. Kyzyl-Yrmak, 17.VIII.1931; Sir bei Urmia (Zugmayer; Wiener Museum).

88. **Aiolopus thalassinus** (Fabricius).

Western Anatolia: Kassaba, Manisa prov., 1.VIII.1931.

89. **Aiolopus strepens** (Latreille).

Western Anatolia: Kassaba, Manisa prov., 1.VIII.1931; Habiblar, mts. S. of Tireh, 20.VII.1931.

90. **Oedaleus decorus** (Germar).

Western Anatolia: between Tireh and Ephesus, 20.VII.1931.

Anatolian plateau: Demirchi, S. of Simav, 3.-4.VIII.1931; between Ankara and Changri, 10.VIII.1931.

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

91. **Pyrgodera armata** (Fischer Waldheim).

Anatolian plateau: Ankara, 12.VII.1931; Bitlis (Wien. Museum).

S. Turkey: Urfa and environs, VII.1931 (Eshref Bey).

92. **Brunnerella mirabilis** Saussure.

Anatolian plateau: between Ankara and Tuz-Goel, 14.VIII.1931.

This typically Iranian species has been previously known only from Northern Persia, and Ordubad, in the Araxes valley, was the most western point of its known occurrence.

93. **Oedipoda coerulescens** (Linnaeus).

Western Anatolia: Burnova near Smyrna, 15.VII.1931.

Anatolian plateau: between Ankara and Changri, 10.VIII.1931.

94. **Oedipoda miniata** (Pallas).

Western Anatolia: Habiblar in mts. S. of Tireh, 21.VII.1931.

Southern Turkey: Urfa and environs, VII.1931 (Eshref Bey).

95. **Oedipoda schochii** Saussure.

Anatolian plateau: Ankara, 10.VIII.1931; between Ankara and Tuz-Goel, 14.VIII.1931; mt. Kai-Dagh, N. of Ankara, 10.-13.VIII.1931.

Southern Turkey: Urfa and environs, VII.1931 (Eshref Bey).

The specimens from Urfa are a little larger than the typical form described by Saussure from Aleppo, while all Ankara specimens are even smaller than subsp. *caucasica* Sauss. I abstain, however, from dividing the species into geographical forms without making a detailed study of local variations.

96. **Oedipoda aurea** Uvarov.

Western Anatolia: Between Tireh and Ephesus, 20.VII; Habiblar in the mts. South of Tireh, 21.VII; Goelchik in the Bozdagh mts., Smyrna prov., 29.VII; Demirchi, S. of Simav, 3,000 ft., 3.-4.VIII; Geubek, between Ushak and Alachehir, 6.VIII.

Anatolian plateau: Akchehir, 1.-15.V; 10.IX.-20.X.1931 (Wagner); Ankara, 15.VIII.

This beautiful golden-winged species was recorded by Saussure (Prodr. Oedip., 1884, p. 149; *O. miniata* var. *flava*) from Baghdad and Smyrna, but the first of these records appears very doubtful. Reliable records of its distribution embrace Palestine, Anatolian plateau (above records and Bimbogha Dagh, whence it was recorded by I. Bolívar under the name *O. coerulescens* var. *sulphurescens*) and Western Anatolia. The species must occur in Syria, as well, though it is not yet recorded from there.

It is interesting to note that, although *O. aurea* nearly reaches the Aegean sea, it does not cross it. Indeed, in Greece and Macedonia a

closely allied species, *O. miniata* sbsp. *meridionalis* Ramme is found; this is known also from the Asiatic coast, namely from Brussa (Werner, *l. c.*), that is from the purely Mediterranean district of Asia Minor. This lack of overlapping suggests that *aurea* may be only a subspecies of *miniata*, but it must be remembered that our knowledge of the fauna of North-Western Anatolia is particularly scanty and negative evidence from that area cannot be accepted. I prefer, therefore, tentatively to regard *aurea* as a distinct species.

I have found this insect fairly common in several localities visited in 1931, usually on limestone outcrops, often on almost bare rocks. The flash of their golden wings against the white background of limestone creates an unforgettable impression.

97. **Sphingonotus turcicus** Uvarov.

Anatolian plateau: Ankara, 10.VIII.1931; between Ankara and Changri, 10.VIII.1931; mt. Kai-Dagh, N. of Ankara, 10.-13.VIII.1931; between Ankara and Tuz-Goel, 14.VIII.1931; between Ankara and Cheshme-Keupri on r. Kyzyl-Yrmak, 17.VIII.1931.

A very common species on rather barren, more or less gravelly slopes of hills in the wide environs of Ankara, where it occurs usually in the association with *S. nebulosus anatolicus*.

98. **Sphingonotus nebulosus anatolicus** Uvarov.

Anatolian plateau: Ankara, 10.VIII.1931; mt. Kai-Dagh, N. of Ankara, 10.-13.VIII.1931; between Ankara and Tuz-Goel, 14.VIII.1931.

99. **Sphingonotus mecheriae** Krauss.

Western Anatolia: Alachehir, 7.VIII.1931; Urla, S. W. of Smyrna, 17.VII.1931.

Anatolian plateau: Tuz-Goel, 14.VIII.1931.

Not yet recorded from Asia Minor. In all three localities this species was found on saline soil.

99 a. **Sphingonotus theodori** Uvarov.

Anatolian plateau: between Salihli and Borlu, 2.VIII.1931; Geubek, between Ushak and Alachehir, 6.VIII.1931; mt. Kai-Dagh, N. of Ankara, 10.-13.VIII.1931; between Ankara and Tuz-Goel, 14.VIII.1931.

Southern Turkey: Urfa, 1931 (*Eshref Bey*).

Iraq: Khanaqin, 26.V.1932; Zirga Zarow hills, Arbil distr., 31.V.1932.

I recorded already this species from the Ankara province, but new records show that it penetrates westwards almost to the Aegean plains, while the northern limit is constituted by the great mountain chains running parallel to the Black Sea between Ankara and the coast. The occurrence of *S. theodori* in the foothills of the Iraqi Kurdistan is not unexpected, since the species has been known from Anatolia and Palestine, on one hand, and from Persia on the other.

100. **Sphingonotus pilosus** Saussure.

Anatolian plateau: between Salihli and Borlu, 2.VIII.1931; Kula, 35 kms. N. E. of Alachehir, 7.-8.VIII.1931; Ankara, 15.VIII.1931.

Southern Turkey: Urfa and environs (*Eshref Bey*).

This interesting species has been previously known only from Northern and Western Persia and its occurrence at the extreme West of the Anatolian plateau is unexpected. In all three localities where I found *S. pilosus* it proved to be most closely connected with volcanic rocks. On the road between Salihli and Borlu it was common on black lava-streams, and the extensive lava fields at the foot of the Kula volcano were also harbouring these grasshoppers which were practically the only insects enlivening these peculiar landscapes. At Angora I found *S. pilosus* in small numbers at the top of one of the hills about two kilometres east of Kavakly-Dere, on and round some outcropping volcanic rocks. The environs of Urfa are also partly volcanic which accounts for the occurrence of *S. pilosus* there.

The specimens from Borlu and Kula are very dark in colour and densely marked with black; those from Ankara are smaller in size and

reddish-black in colour. However, I am unable to find sufficiently stable characters to separate Anatolian specimens from the Persian ones.

Bey-Bienko recently suggested (Bol. Soc. Esp. Hist. Nat., xxxi, 1931, p. 225), that this species and its allies should be separated into

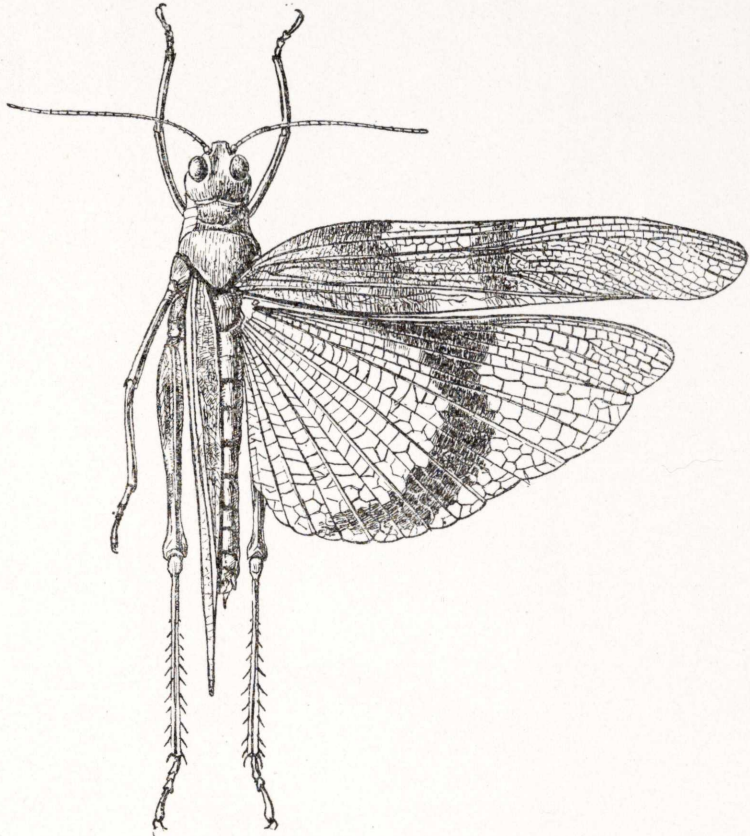


Fig. 28.—*Heliapteryx humeralis* (Kuthy), ♂.

a genus intermediate between *Sphingonotus* and *Thalpomena*, but it appears quite impossible to draw a line even between those two genera, without introducing a third one.

101. ***Sphingonotus callosus*** (Fieber).

Southern Turkey: Urfa and environs (*Eshref Bey*).

Northern Syria: E. of Aleppo, 11.VI.1932.

102. **Heliopteryx humeralis** (Kuthy).

(Fig. 28.)

Southern Turkey: Urfa and environs, VII.1931 (*Eshref Bey*).

The species was described by Kuthy (Ann. Mus. Hung., 1907, p. 431) from the Cilician Taurus and again by me (Mitt. Kaukas. Mus., VIII, 1914, p. 140) from Persia and Transcaucasia. Correct synonymy was established by me in another paper (Bull. Mus. Caucase, XII, 1919, p. 157). I take this opportunity to publish a figure drawn from a male from Teheran, Persia.

103. **Egnatioides farsistanicus** Uvarov.

Kurdistan: Zirga Zarow hills, Arbil district, 31.V.1932; Khanaqin. 26.V.1932.

The Irak specimens differ somewhat from types (described in Ann. Instit. Zool. Leningrad, 1933) by more slender habitus, longer elytra and less raised margins of the vertex and of the frontal ridge. None of the differences is sufficiently definite to be regarded even of subspecific value.

This little grasshopper has been found fairly commonly on low gravelly hills with very scanty vegetation, usually in company with *Tmethis gibber* and *Eremiaphila turcica*.

104. **Charora pentagrammica** I. Bolívar.

Anatolian plateau: Ankara, 10-15.VIII.1931.

This interesting species was common on the higher slopes of the volcanic hills SW. of Ankara, particularly in a place 1-2 miles east of its new «garden suburb» Kavakly-Dere.

105. **Tmethis cisti** (Fabricius).

Syria: 40 miles around Aleppo (Brit. Museum); Urfa (*Eshref Bey*).

Kurdistan: Zirga Zarow hills, Arbil district, 31.V.1932.

106. *Tmethis carinatus* (F.)

1775. *Gryllus carinatus* Fabricius, Syst. Ent., p. 288 (*nec auct.!*).

The synonymy of this species has been discussed at some length by me in 1924 (Bull. Min. Agr. Egypt, No. 41, pp. 33-34), but the conclusions reached at that time must be completely revised now, in the light of new evidence.

The type of *G. carinatus* being non-existent, the only possible way of approaching a correct interpretation of the species is by carefully comparing the original description with specimens of the same genus from the typical locality. Fabrician type specimen was taken by Forskal on his voyage to Arabia with Niebuhr and from Niebuhr's account it appears that collections have been made in some places in Yemen and at Jidda. No *Tmethis* is known to me to occur in Yemen, although I have before me now fairly extensive collections from that part of Arabia. On the other hand, the collection made by Mr. H. St. J. Philby contains a pair of *Tmethis* taken at Jidda and these specimens agree with the original description of *E. carinata* better than any other species known to me. The essential points of the description are, as follows: «... Carina trifida, lobo postico acuto. Elytra virescentia. Alae concolores fascia versus apicem atra...». The point about the pronotal carina was interpreted by me (*l. c.*) to mean that the hind angle of the pronotum is acute, while actually the adjective applies to the carina, which certainly has an acute edge in the Jidda insect, while the pronotal angle is rounded. The elytra in my Jidda specimens are pale buff, with chocolate brown pattern, but in the male the basal part is tending towards sulphur-yellow, even with a very faint greenish tinge. Wings are definitely greenish and possess, instead of the usual fascia, two blackish spots in the anterior part, beyond the middle of their length; this reduced fascia is particularly well marked in the male, while in the female it is very faint. In any case, this type of pattern would agree well with the Fabrician description quoted above.

Taking all this into consideration, there is no reason to doubt that the specimens from Jidda represent the true *Gryllus carinatus* of Fabricius. To the same species belongs a female in the Vienna Museum,

also from Arabia but without an exact locality, to which Saussure (Prodr. Oedip., p. 228) refers. On the other hand, I have examined the specimens on which Serville based his descriptions of *Eremobia carinata* (nec F. !) and of *E. continuata* kindly brought for me to London by Dr. Chopard. They proved to be both collected in Egypt by Bové in 1833 and to represent merely the two sexes of one species, *continuata* being a male, and *carinata* a female, and both conspecific with my *Tmethis aegyptius* (l. c.) which thus becomes a pure synonym of *E. continuata* Serv. Moreover, the differences between the true *carinata* F. from Jidda and the Egyptian *continuata* Serv. are clearly not more than subspecific, and my *Tmethis moritzi* (1929) from Persia represents a third subspecies of the same species.

Specific characters of *T. carinatus* F. will be obvious from my description of *T. aegyptius* (l. c.), and the three known subspecies can be recognised from the following short diagnoses and figures.

106 a. ***Tmethis carinatus carinatus*** (F.)

(Fig. 29.)

1775. *Gryllus carinatus* Fabricius, Syst. Ent., p. 288 (nec auct.!).

Pronotum relatively short and stout, the metazona being distinctly broader in the shoulders than long, parabolic in shape, with broadly rounded apex. Elytra strongly marked with angular chocolate-brown spots. Wing fascia in the male represented by two contiguous spots in the two anterior sections of the wing; in the female there is only one indefinite spot in the second section.

Arabia: Jidda.

106 b. ***Tmethis carinatus continuatus*** (Serv.)

(Fig. 30.)

1839. *Eremobia carinata* Serville (nec F. !), Ins. Orth., p. 706, ♀.

1839. *Eremobia continuata* Serville, l. c., p. 707, ♂.

1924. *Tmethis aegyptius* Uvarov, Bull. Min. Agr. Egypt, No. 41, p. 34 (syn. nov.)

Larger than the typical form, but more slender. Pronotum relatively longer; metazona scarcely broader than long, with the apex nar-



Fig. 29.

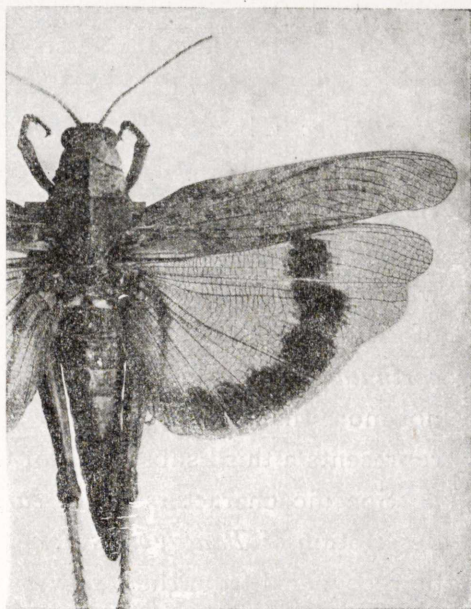


Fig. 30.



Fig. 31.

Fig. 29.—*Tmethis carinatus carinatus* (F.), ♂, Jidda, Arabia; fig. 30.—*T. carinatus continuatus* (Serv.), ♂, Cairo, Egypt; fig. 31.—*T. carinatus moritzi* Uv., ♂, Shirag, Persia.

rowly parabolic, the angle being acute, rounded. Elytra with the dark pattern indistinct. Wing fascia in the male complete, about 5 mm. wide, leaving a very narrow hind margin; in the female obsolete, but also continuous.

Egypt: see Uvarov, *l. c.*

106c. ***Tmethis carinatus moritzi*** Uv.

(Fig. 31.)

1929. *Tmethis moritzi* Uvarov, Ann. Mag. Nat. Hist., ser. 10, vol. iv, p. 537.

About the same size as the typical form, more slender. Metazona of pronotum about as wide as long, acutangular. Elytral pattern sharp. Wing fascia complete.

Persia: Khorasan; Shiraz.

The measurements of the three subspecies are, as follows:

	<i>carinatus</i>		<i>continuatus</i>		<i>moritzi</i>	
	♂	♀	♂	♀	♂	♀
Total length.....	37	55	45	65	40	48
Pronotum.....	11.5	15	12.5	17	11	14
Elytron.....	33	45	38	50	37	46
Hind femur.....	17	23	18	26	17	20

107. ***Tmethis gibber*** (St.)

Saussure was responsible for the considerable confusion with regard to this Syrian species and *T. festivus* of Armenia. That author separated the Armenian species from the Syrian one quite correctly, but his description of the Syrian species is based on specimens from both Syria and Armenia, and it is scarcely possible to use his diagnoses for the determination.

Actually the two insects are clearly distinct, in spite of the considerable geographical variation in each one of them. *T. gibber* is always recognisable by the blue hind tibiae, while in *T. festivus* they are red.

The range of geographical variation in *T. gibber* is unexpectedly great, as is proved by an extensive series of specimens accumulated by me for study.

The variation, however, concerns almost entirely the colour and the pattern of the hind wings. In the typical form, of Aleppo, Syria, the whole wing is black, apart from a whitish preapical fascia. Near the base of the wing, however, a blue tinge is noticeable, and in the extensive series of specimens from Urfa, S. Turkey, interesting transitions can be seen from the black wing, to one which is blue in the basal part, with a very broad black fascia followed by a whitish one. The specimens which I myself collected near Arbil in the foothills of Kurdistan belong to the Urfa form with blue wings broadly fasciated with black, but in some of them the blue colour of the wing base becomes paler and assumes a greenish shade while the fascia becomes narrower. Still further to the south, near Khanaqin, these tendencies continue to develop and the result is a greenish wing with a quite narrow black fascia; however, in some of the Khanaqin specimens, the colour of the wing is still greenish-blue. Finally, at the southern extremity of the same mountain system, near Ahwaz, a striking form with sulphur-yellow wings and an extremely narrow, partly interrupted fascia occurs, which one would never suspect of direct connection with the black-winged form of Syria, if there were no continuous series to prove it.

While the series is fully continuous and there are no stable differences between the forms, the variation is clearly geographical and it would be of definite advantage if the best marked forms were accorded subspecific rank. At present, the following four subspecies can be distinguished.

107a. *Tmethis gibber gibber* (St.)

1876. *Eremobia gibbera* Stål, Bih. Svensk. Akad. Handl., iv (5), p. 27.

1884. *Eremobia gibbera* Saussure, Prodr. Oedipod., p. 231 (*ad partim*!).

Whole wing black, with bluish shade at the base; a milky-white fascia in the apical third; two apical lobes blackened; a narrow whitish, or bluish-white, posterior margin.

The basal part of the black portion is sometimes bluish-black, but not definitely separated from the remaining black portion.

S. Turkey: Urfa.

N. Syria: Aleppo (Stål, *l. c.*; British Museum).

107b. ***Tmethis gibber latus*** sbsp. n.

Basal third of the wing blue (slightly greenish anteriorly in the more southern individuals); black fascia very broad; posterior margin bluish, broader than in the typical form; two apical lobes blackened.

S. Turkey: Urfa, 2 ♂♂, 2 ♀♀ (*Eshref Bey*).

Kurdistan: Arbil district, Zirga Zarow hills, 3I.V.1932, 2 ♂♂ (including the type), 2 ♀♀ (Uvarov); Kirkuk, 4.IV.1923, 1 ♀ (R. W. G. Hingston).

In the Urfa specimens the black wing fascia is generally broader than in the *Kurdistan* ones and they serve to connect this subspecies with the typical one. The occurrence of both forms at Urfa indicates that an overlapping of the two subspecies occurs in that area.

107c. ***Tmethis gibber angustus*** sbsp. n.

More than the basal third of the wing pale greenish-blue; black fascia narrow; posterior margin about half the width of the fascia; first apical lobe distinctly, the second faintly, infumate.

S. Kurdistan: Khanaqin, 26.V.1932, 3 ♂♂ (including the type), 2 ♀♀ (Uvarov); Khanaqin, R. Diala, 1.VIII.1918, 1 ♂, 1 ♀ (P. A. Buxton); Kizil Robot, V.1919, 1 ♂, 1 ♀ (H. D. Peile).

Amongst the Khanaqin specimens there are some in which the band is only a little narrower than in *T. gibber latus*; in others the colour of wings is more bluish than greenish. The locality, therefore, must lie in the area where the two subspecies are not yet clearly separated. The male from Kizil Robot is also nearer to *latus* than to the present subspecies, while the female from the same place is a typical *angustus*.

107d. *Tmethis gibber reductus* sbsp. n.

Wings light sulphur-yellow; fascia very narrow, often discontinuous; posterior margin broader than fascia; apical lobes faintly infumate in the male, scarcely so in the female.

S. Persia: Bushire to Burusdjun, 21.V.1927, 1 ♀ (type; M. Siazov); Masjid-i-Sulaiman, N. of Ahwaz, 16.-28.VI.1932, 1 ♀ (S. V. Pill), 1 ♂, 2 ♀♀ (F. Marsh).

It will be seen, that the differences between the four subspecies of *T. gibber* are purely relative ones, and no reliable characters have been found in the morphology. For practical purposes it appears convenient to express the differences by means of a proportion between the width of the three differently coloured zones of the wing. That width can be measured by the length of the sections of the first radius within each colour zone, as follows: *a*), in the basal light coloured disc, from the base of the radius to the inner margin of the dark fascia; *b*), in the dark fascia; *c*), in the pale outer border.

For better comparison, the measurements are calculated as the percentages of the total length of the radius, measured from its base to the apex.

The following proportions bring out the differences between the four subspecies with sufficient clearness:

<i>Tmethis gibber gibber</i>	0:96:4.
<i>Tmethis gibber latus</i>	48:47:5.
<i>Tmethis gibber angustus</i>	65:27:8.
<i>Tmethis gibber reductus</i>	70:15:15.

108. *Tmethis saussurei* Uvarov.

N. E. Turkey: Söört, Bitlis (Zugmayer; Wiener Museum).

109. *Tmethis heldreichi* (Brunner Wattenwyl).

I made some comments in my previous paper on the Orthoptera of Turkey (1930) on the probable affinity of *T. escherichi* and *T. heldreichi*, as well as on the geographical variation in the development of

elytra and in the structure of pronotum in *T. escherichi* from different regions of Asia Minor. More extensive material which I have before me at present enables me to distinguish at least six different subspecies of a single species which must be called *T. heldreichi* according to the law of priority.

Differences between the subspecies can be found in several inde-

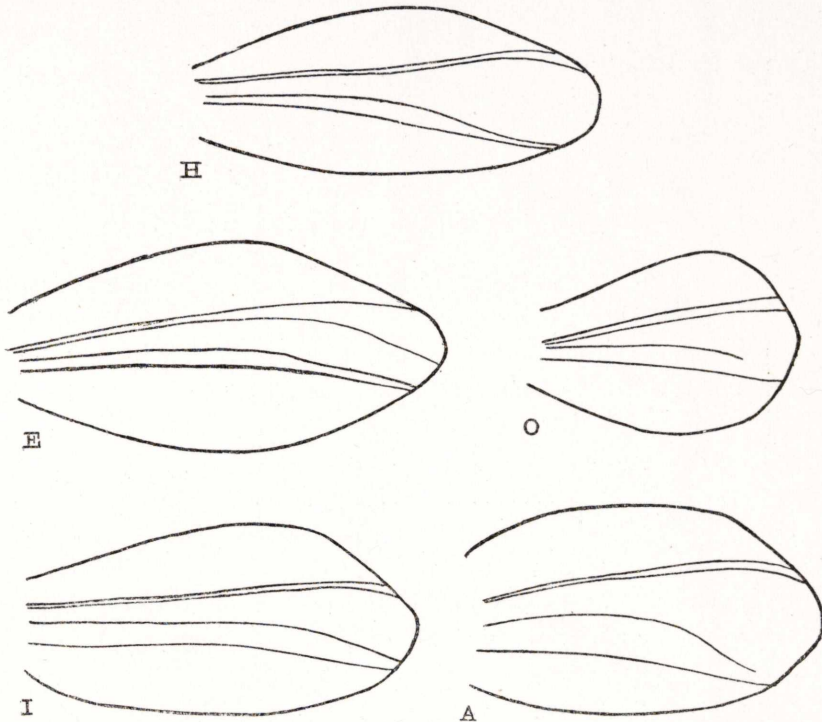


Fig. 32.—Right male elytra of *Tmethis heldreichi heldreichi* (H), *T. h. escherichi* (E), *T. h. ovipennis* (O), *T. h. inermis* (I), *T. h. adaliae* (A).

pendent characters and appear to be sufficiently stable even when large series of specimens are available. In the first instance, the degree of the development of elytra is clearly subspecific; this finds its expression not only in the relative length and width of elytra, but in their shape, as well (see fig. 32).

The sculpturing of the pronotum is also very characteristic for each subspecies; a particularly convenient diagnostic feature dependent on the sculpturing can be found in the degree of development and the shape of the lateral tubercle of mesozona (this tubercle actually represents the lateral keel in its section included between the

second and the third transverse sulcus). General shape of pronotum, the proportion between prozona and metazona, etc., are also subspecific, but difficult to define exactly. In most of the subspecies known to me, middle tibiae are provided with a dense row of small tubercles along the upper carina, but one subspecies has the carina perfectly smooth. The coloration of the inside of hind femur and tibia presents further subspecific variation, but only in one case are the differences sufficiently obvious to be used for diagnostic purposes.

The differential characters of the subspecies will be easily understood from the following key.

Key to subspecies of *T. heldreichi*.

- 1 (2). Elytra in the male fully developed, reaching beyond hind knees. (Elytra in the female very short, extending just beyond the first tergite). Pronotum with acute dense ridge-like tubercles; lateral tubercle of mesozona acute. Middle tibia with a regular series of tubercles along the upper margin. Hind femur inside carmine-red, gradually turning to violaceous near the base. (Afyun-Karahissar, Akchehir.)..... a. **T. h. dimorphus** subsp. n.
- 2 (1). Elytra abbreviated in both sexes.
- 3 (10). Elytra in the male about, or more than, twice as long as their maximum width. Middle tibia in the male with a series of tubercles along the upper margin.
- 4 (5). Hind femur inside and hind tibia yellow; the former with a blue basal spot. Lateral tubercle of mesozona broadly rounded. Elytra in the male narrow, two and half times as long as their maximum width which is about the middle. (Macedonia, Greece.)..... b. **T. h. heldreichi** Br. W.
- 5 (4). Hind femora and tibiae mainly red on the inside.
- 6 (7). Lateral tubercle of mesozona acute. Male elytra more than twice as long as their maximum width which is about the middle. (Ankara, Elma Dagh.)..... c. **T. h. escherichi** Kr.
- 7 (6). Lateral tubercle of mesozona rounded.
- 8 (9). Pronotum practically smooth. Male elytra more than twice as long as their maximum width which is in the apical third. Hind femur and tibia sanguineous. (Changri.)..... d. **T. h. inermis** sbsp. n.
- 9 (8). Pronotum with rounded tubercles. Male elytra less than twice as long as their maximum width which is in the middle. Hind femur and tibia carmine red. (Adalia.)..... e. **T. h. adaliae** Uv.
- 10 (3). Elytra in the male half again as long as their maximum width which

is in the apical fourth. Middle tibia in the male smooth. Hind femur inside and hind tibia dirty-reddish, the former bluish-black in the basal half. Lateral tubercle of mesozona very acute, conical. (Beypazari) f. **T. h. ovipennis** sbsp. n.

109a. **Tmethis heldreichi dimorphus** sbsp. n.

(Fig. 33D.)

The male of this subspecies has the elytra and wings fully developed and resembles greatly *T. limbatus* Charp. This latter species is represented in the British Museum by a male from Gallipoli and differs strikingly by the coloration of hind legs and wings, as well as by the structure of pronotum. The female of *T. h. dimorphus* is remarkable because its elytra are relatively shorter than in any other known subspecies, while this is the only subspecies with fully winged male.

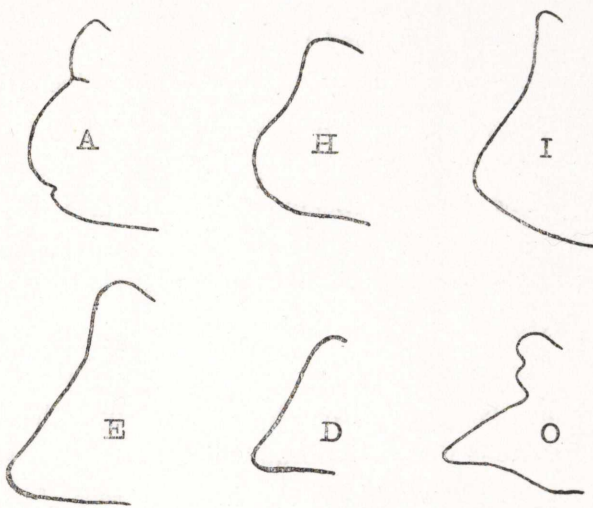


Fig. 33.—Lateral tubercles of mesozona of pronotum in *Tmethis heldreichi adaliae* (A), *T. h. heldreichi* (H), *T. h. inermis* (I), *T. h. escherichi* (E), *T. h. dimorphus* (D), *T. h. ovipennis* (O).

Anatolian plateau: Afyun-Karahissar, 16. III.1927, 2 ♂♂ (including the type), 1 ♀; no exact locality, 2 ♂♂; Ak-Chehir, I.V.-28.VI.1931, 3 ♂♂, 1 ♀ (Wagner; in Dr. Willemse's collection).

This subspecies appears to be restricted to the south-western edge of the plateau.

109b. **Tmethis heldreichi heldreichi** (Br. W.)

(Figs. 32H, 33H.)

Brunner-Wattenwyl described this insect as a member of the genus *Glyphamus*. The type of that genus is *G. obtusus* Fieber, an

insect sufficiently distinct (in the structure of pronotum and in the extreme reduction of elytra) from all members of the genus *Tmethis* to make invalid Stål's (Observ. orth., 2, p. 26) and my (Trans. Ent. Soc. London, 1923, p. 156) suggestion to unite the two genera.

The typical subspecies of *T. heldreichi* is known from Athens and southern Macedonia. It is at once distinguished from other subspecies by the coloration of hind legs.

109c. ***T. heldreichi escherichi*** (Krauss).

(Figs. 32 E, 33 E.)

Krauss described his species from «Angora», but it is not certain where actually the types have been collected by Dr. Escherich, and the geographical variability of this species so great that it is necessary to have very exact locality data when subspecies are concerned.

However, the specimens which Sureya Bey and myself have collected in the immediate vicinity of Ankara agree perfectly well with the original description, and I take them to represent the typical form of *escherichi*.

Forms, which I am unable to separate from *escherichi*, are known to me also from Elma-Dagh. On the other hand, amongst Ankara specimens there are some which approach very closely the next subspecies. It would appear that the areas of the two subspecies overlap in that locality, and future collectors should pay special attention to a systematic exploration of this problem.

109d. ***Tmethis heldreichi inermis*** sbsp. n.

(Figs. 32 I, 33 I.)

A large and handsome form, with the pronotum practically smooth. I found this insect only on the trip from Ankara to Changri, although some specimens of *T. heldreichi* from the environs of Ankara exhibit a considerable resemblance to this subspecies (see above).

Described from 3 ♂♂ (including the type) and 7 ♀♀, taken between Ankara and Changri, 10.VIII.1931.

109e. *Tmethis heldreichi adaliae* Uv.

(Figs. 32 A, 33 A.)

1928. *Tmethis heldreichi adaliae* Uvarov, Entom. Mitteil., xvii, p. 176.

This subspecies is rather similar to *T. h. inermis*, but the differences in the colour of hind legs and in the shape of elytra are well pronounced, while the areas of distribution are clearly separated.

Known only from Adalia, in SW. Anatolia.

109f. *Tmethis heldreichi ovipennis* sbsp. n.

(Figs. 32 O, 33 O.)

On superficial examination, there is a great general resemblance between this subspecies and *T. h. escherichi*, but the new subspecies differs unexpectedly from all others by the complete absence of tubercles on the middle tibiae. The shape of the male elytra is also very peculiar.

Described from a long and very uniform series of 31 ♂♂ and 32 ♀♀, all taken at Beypazari, 75 km. W.-N.-W. of Ankara (Sureya Bey).

Table of measurements.

	<i>dimorphus</i>		<i>heldreichi</i>		<i>escherichi</i>		<i>inermis</i>		<i>adaliae</i>		<i>ovipennis</i>	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Length of body.....	26	35	28	38	28	38	29	38	29	39	25	35
— of prozona....	3	5	4	5	4	6	4	6	4	6.5	4	6
— of metazona...	5.5	7	5	6	5.5	6.5	5	7	5.5	7	4.5	6.5
— of elytra.....	21	6	9.5	9	10-12	8	9	7.5	9	9	6	5.5
— of hind femur..	14	18	15	19	14.5	19	16	19	15	20	12.5	17

110. *Tmethis holtzi* Werner.

Anatolian plateau: between Ankara and Tuz-Goel, 14.VIII.31.

This species was previously known only from the Cilician Taurus. It cannot be confused with the more common *T. escherichi* already

owing to the striking difference in the coloration of hind legs on their inner surface. In *T. escherichi* they are bright-purple throughout, and only in the female the colour sometimes becomes bluish-purple at the base of hind femur; in *T. holtzi* the femur is very dark blue, and the tibiae bright violaceous, turning to red near the apex, with the spines red.

The size of *T. holtzi* is considerably smaller than that of *T. escherichi*. Since no measurements were given in the original description of *T. holtzi*, I will give them here, as follows.

Length of body ♂, 25; ♀, 32; pronotum ♂, 8; ♀, 9.5; elytra ♂, 16; ♀, 6; hind femur ♂, 13; ♀, 15 mm.

It will be seen that the male has fully developed elytra, while in the female they are rudimentary and perfectly lateral.

111. **Prionotropis urfensis** Ramme.

S. Turkey: Urfa and environs (Eshref Bey).

This insect has been recently described from the same source by Ramme (Mitt. Zoolog. Mus. Berlin, 18 Bd., 1933, p. 431). It is probably only a subspecies of *P. maculinervis*, known from Amasia.

112. **Pyrgomorpha conica** (Olivier).

S. Turkey: Urfa and environs (Eshref Bey).

113. **Pyrgomorpha brevipennis** I. Bolívar.

S. Turkey: Urfa and environs (Eshref Bey).

Known from S. Transcaucasia and Syria.

114. **Pezotettix anatolica** sp. n.

(Figs. 34A, 34A ♀.)

Closely allied to *P. platycerca* Stål, but strongly differing from it in the shape of the male cerci which in *P. platycerca* are shorter, with the upper apical lobe more prominent and the lower angle attenuate. Subgenital plate of the female is simple in both species.

Total length ♂, 14; ♀, 18; pronotum ♂, 3; ♀, 4; elytra ♂, 2.5; ♀, 3; hind femur ♂, 7.5; ♀, 9 mm.

Western Anatolia: Burnova, near Smyrna, 15.VII.1931, 7 ♂♂ (including the type), 8 ♀♀; Demirchi, S. of Simav, about 3,000 ft., 3.4.VIII.1931, 2 ♂♂, 2 ♀♀; Smyrna, 1 ♂, 3 ♀♀ (Berlin Museum); Kavakli nr. Ankara (Berlin Museum; locality very doubtful).

115. *Pezotettix judaica* sp. n.

(Figs. 34J, 34J ♀.)

Closely allied to *P. platycerca* Stål, but differs strongly in the shape of the male cerci, and of the female subgenital plate which is trilobate in the new species and simple in *P. platycerca*.

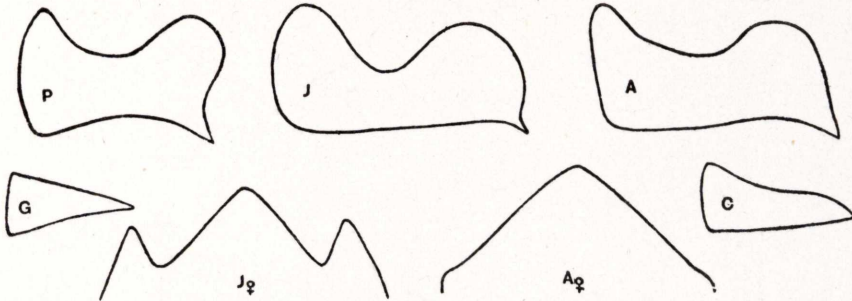


Fig. 34.—P, *Pezotettix platycerca*, male cercus; J, *P. judaica* do.; J♀, *P. judaica*, female subgenital plate; A, *P. anatolica*, male cercus; A♀, *P. anatolica*, female subgenital plate; G, *P. giornae*, male cercus; C, *P. curvicerca*, male cercus.

Total length ♂, 13; ♀, 17; pronotum ♂, 3; ♀, 4; elytra ♂, 2.5; ♀, 3.5; hind femur ♂, 7; ♀, 9 mm.

Palestine: Kiryat Anawim, 15 km. West of Jerusalem, 2 ♂♂ (including the type), 5 ♀♀ (F. Bodenheimer); Jerusalem, 9.III.1921, 1 ♀ (P. A. Buxton); Bethlahem, 25.III.1918, 1 ♂ (Storey); Place of Sacrifice, Mt. Carmel, 1.IV.1930, 1 ♂, 1 ♀.

116. *Pezotettix curvicerca* sp. n.

(Fig. 34, 35 C.)

Closely allied to *P. giornae* Rossi, but differs in the longer male cerci, which are strongly flattened; seen from above, they are distinctly

incurved; seen in profile, they are gradually and moderately narrowed towards the apex. Supraanal plate of the male as in *P. judaica*, and differs from that in *P. giornae* by more broadly rounded sides, which are not inflexed near the base.

Total length ♂, 11.5; ♀, 15; pronotum ♂, 3; ♀, 3.5; elytra ♂, 2.5; ♀, 3; hind femur ♂, 6.5; ♀, 8 mm.

Palestine: Jerusalem, 3 ♂♂, 8 ♀♀ (F. Bodenheimer).

It will be seen that the genus *Pezotettix* includes many more species than have been known previously and that a careful morpho-

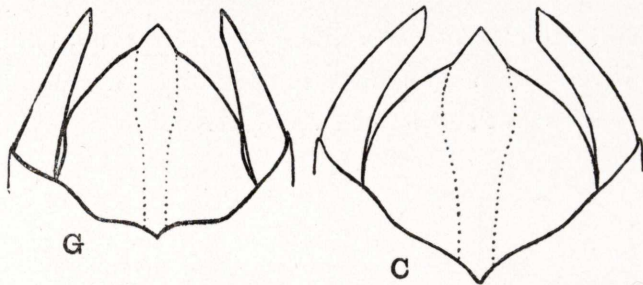


Fig. 35.—Male genitalia of *Pezotettix giornae* (G) and *P. curvicerca* (C).

logical study is necessary to reveal several species confused under the names *giornae* and *platycerca*. These have been the only two species in the genus (apart from *rugulosa* which is not even a *Pezotettix*, but belongs to an undescribed genus; see below), but it appears now that there are at least two well distinct species with pointed cerci (*giornae*, and *curvicerca*) and three with the cerci expanded (*platycerca*, *judaica* and *anatolica*). All previous records of the distribution of *P. giornae* and *P. platycerca* must be, therefore considered unreliable and should be revised.

Gen. **Sphenophyma** nov.

Allied to *Pezotettix* Burm. and *Paraconophyma* Uv., but differing from both in the shape of the prosternal tubercle and in the strongly raised median pronotal carina and rugose body, which makes the insect superficially similar to a small member of the subfamily *Pamphaginae*.

Antennae filiform, somewhat flattened in the basal portion.

Face somewhat oblique. Frontal ridge in profile weakly convex; viewed from the front it is slightly and gradually widened downwards; the surface coarsely punctured, slightly concave; margins little raised, but sharp. Fastigium of vertex forming a distinct angle with the frontal ridge, the angle being more rounded in the female; surface convex with sharp raised margins converging in front; foveolae well defined, though scarcely concave, coarsely punctured, with smooth, not raised margins. Occiput with a distinct median carina extending to the apex of the fastigium.

Pronotum with the median carina well raised, acute, convex in profile; lateral carinae acute, linear in front of the first sulcus, obsolete between the sulci, and somewhat distinct again in the metazona. Transverse sulci distinct, fine. Hind margin truncate.

Prosternal tubercle low, transverse, in the shape of a blunt wedge, with the apex slightly concave; its posterior surface sloping forward. Mesosternal lobes rectangular; their interspace is quadrate in the male and transverse, rectangular in the female. Metasternal lobes well separated even in the male.

Abdomen with a distinct median carina on its whole length. Male external genitalia of the same type as in *Pezotettix giornae*. Female subgenital plate somewhat thickened, with the apex prominent, bilobate. Lower valva of the ovipositor with a strong outer lateral tooth, and a small tooth near the base of the inner margin. Upper valva almost wholly covered up from above by large anal valva.

Front and middle femora incrassate, carinate. Hind femur with the upper carina denticulate. Hind tibia without the outer apical spine.

Elytra lateral, reaching the second tergite, considerably longer than wide, somewhat widened near the apex.

Genotype: *Platyphyma rugulosa* Stål.

There is no doubt that *Pl. rugulosa* is not congeneric with the other species now included in the genus *Pezotettix* (see above). The

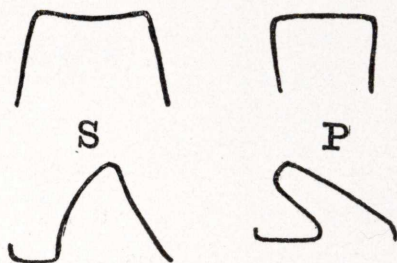


Fig. 36.—The view front behind and in profile of prosternal tubercles in *Sphenophyma* (S) and in *Pezotettix* (P).

difference is mainly in the structure of the prosternal tubercle which in *Pezotettix* is strongly inclined backward, so that its posterior surface is not visible when the insect is viewed from below; besides, the edge of the tubercle is much more rounded in *Pezotettix* than it is in *Sphenophyma*, as can be seen from my figures (fig. 36). The general appearance of *Sphenophyma* is that of a Pamphagid owing to the high pronotal carina and rugose body.

Considerable affinity exists between *Sphenophyma* and the Indian mountain grasshoppers of the genus *Paraconophyma*, but the differences in the structure of the head, pronotum and prosternum are very great.

117. ***Sphenophyma rugulosa*** (Stål).

(Figs. 36 S, 37.)

The male of this interesting species has not yet been described. It is extremely similar to a small *Paranocarodes*, or some other Pamphagid, but the prosternal tubercle and the structure of the head

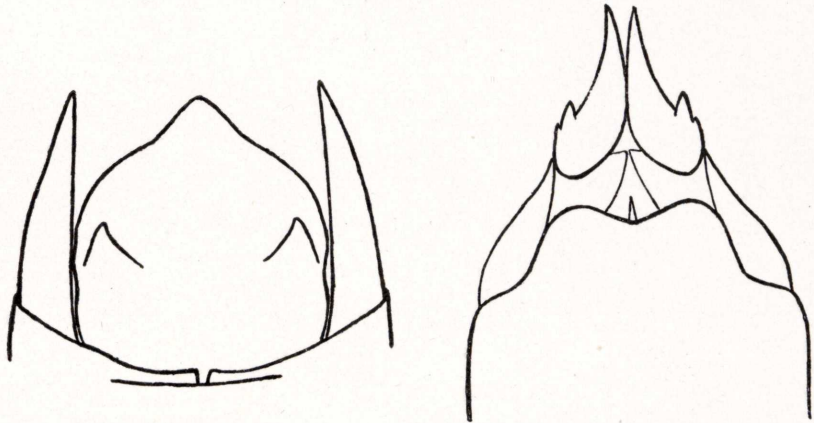


Fig. 37.—*Sphenophyma rugulosa*; end of the male abdomen from above, and of the female from below.

make the resemblance purely superficial. Cerci of the male are simple, elongate-conical, slightly compressed laterally and very slightly incurved. Supraanal plate of the male is oval, a little longer than broad, with the apex somewhat projecting in an obtuse angle; disc with a pair of large flattened sublateral teeth. Last tergite of the male with a narrow excision in the middle. Female subgenital plate

behind with a broad trapezoidal projection, which is shallowly emarginate in the middle; lower valvae of the ovipositor with a strong lateral tooth and a smaller one at its base.

I have examined one male and two females of this interesting species, preserved in Burr's collection, which is temporarily preserved in the British Museum (Natural History); they are labelled «Syrie. Brunner».

My previous record of *P. rugulosa* from Kurdistan (Bull. Mus. Caucase, x, 1916, p. 185) is almost certainly incorrect, since I identified the specimens from the existing inadequate descriptions. It would be necessary also to revise Bolívar's records of this species from Marach, Yenidzhe-Kale and Bimbogha Dagh (Ann. Soc. Ent. Belg., XLIII, 1899, p. 596) and Werner's record from the Cilician Taurus (Sitzber. Akad. Wiss. Wien, cx, 1901, p. 285).

118. ***Dericorys tibialis*** (Pallas).

S. Turkey: Urfa and environs, VII. 1931 (Eshref Bey).

Originally described from the semi-deserts North of the Caspian Sea and known to me from Transcaspia, Transcaucasia and Northern Persia. The present record greatly extends the known area of distribution both to the south and to the west.

119. ***Paracaloptenus caloptenoides*** Brunner-Wattenwyl.

Western Anatolia: Demirchi, S. of Simav, 3.-4.VIII. 1931; between Demirchi and Simav, about 4.000 ft., 5.VIII. 1931.

120. ***Calliptamus italicus*** (Linnaeus).

Western Anatolia: Ali-Agha, N. of Menemen, Smyrna prov., 18. VII. 1931.

Southern Turkey: Urfa and environs, VII. 1931 (Eshref Bey).

The specimens from the Aegean coast are very large and heavily built, while those from Urfa are normal.

121. *Calliptamus tenuicercis* Tarbinsky.

Anatolian plateau: Ankara, 10.VIII.1931; between Ankara and Changri, 19.VIII.1931; mt. Kai-Dagh, N. of Ankara, about 4.000 ft., 10.-13.VIII.1931; between Ankara and Tuz Goel, 14.VIII.1931.

Southern Turkey: Urfa and environs, VII.1931 (Eshref Bey).

The specimens from Urfa, available in a long series, are uniformly larger than those from the inner plateau, with the elytra extending a little beyond hind knees. However, a considerable individual variation is observed amongst the series, and a subspecific separations appears premature.

122. *Calliptamus siculus deserticola* Voss.

Southern Turkey: Urfa and environs, VII.1931 (Eshref Bey).

The specimens are somewhat smaller and less long-winged than the typical ones from the Sahara, but the elytra generally project well beyond the hind knees.

123. *Kripa coelesyriensis angusta* sbsp. n.

(Fig. 38 A.)

Differs from the typical (Syrian) form by the smaller size, more slender habitus, acute pronotal keels, narrow and more prominent forward fastigium of vertex, the margins of which are straight and parallel.

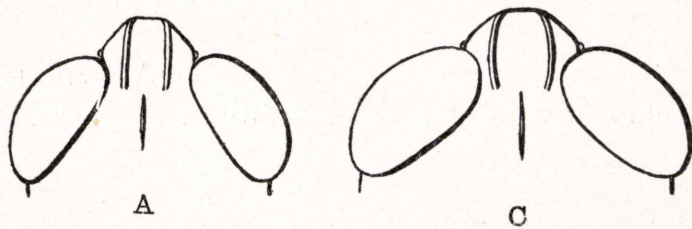


Fig. 38.—Head of the male of *Kripa coelesyriensis coelesyriensis* (C) and *K. c. angusta* (A).

Coloration pale buff, with grey dots, very similar to pale forms of *Calliptamus italicus* (L.); hind femur bright purplish-pink below and on the inside, where there are two indefinite greyish fasciae, which are also perceptible on the upper side; hind tibiae purplish-pink.

Anatolian plateau: Ankara, 10.-15.VIII.1931, 3 ♂♂, 2 ♀♀ (including the type ♂); 1930, 1 ♂, 1 ♀ (Sureya Bey).

The insect is extremely like a small *Calliptamus italicus*, but the structure of the male cerci exhibits the usual generic difference. There is, however, no difference in the cerci, nor in the penis, between the typical *coelesyriensis* of Syria and the Ankara form, so that I regard them as differing only subspecifically.

In one of the paratypic females the inner side of hind femur and the hind tibia are of intense violaceous colour, and the black inner fasciae of the femur are strongly marked. No black form, such as is known in *coelesyriensis*, has been found by me in *angusta*.

124. **Paratettix meridionalis** (Rambur).

Western Anatolia: Habiblar, in the mts. S. of Tireh, 21.VII.1931; Kassaba, 1.VIII.1931; Kula, 35 km. NE. of Alachehir, 7.-8.VIII.1931.

125. **Paratettix caucasicus** Bey-Bienko.

Western Anatolia: between Tireh and Ephesus, 20.VII.1931.

This species was described quite recently (Bol. Soc. Esp. Hist. Nat., xxxi, 1931, p. 226) from Ordubad in the Araxes valley, and I examined some specimens collected by Dr. Burr in Geok-Tapa, E. Transcaucasia.

In view of the apparently wide distribution of *P. caucasicus* it is necessary to revise all previous records of the occurrence of *P. meridionalis* in the Caucasus and Asia Minor.

P. caucasicus is well distinct from *P. meridionalis* in the broader fastigium, and particularly in the more narrow middle femur.

126. **Acrydium depressum** (Brisout).

Western Anatolia: between Tireh and Ephesus, 20.VII.1931; Habiblar in the mts. S. of Tireh, 21.VII.1931; Goelchik, Bozdagh mts., 29.VII.1931.

