

The biogeography of iberian orthopteroids¹

by

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The Iberian Peninsula is of interest to biogeographers, ecologists, and systematists because of its striking zonation, isolation, and strategic location between two continents, Europe and Africa. It is remarkably diverse in its biotic communities. Not surprisingly, its orthopterous fauna is rich, composed in reality of several distinct subfaunae. The only previous discussion of them was CAZURRO (1888), which pioneering effort is now antiquated. Our treatment of the subject, below, will be given after comment on the Peninsula itself.

GEOGRAPHY

The Iberian Peninsula is a shield-shaped land mass of approximately 650 by 600 miles in dimension and 229,640 square miles in area (including certain nearby insular provinces). Though its basic plan was not really completed until late Tertiary times, it was actually roughed out by the end of the Miocene; thus, the land is old if not ancient. It is today comprised of Spain (approximately five sixths of the total land area), Portugal (about one sixth), and the minute territory of Gibraltar. It is bounded on three sides (or about seven eighths of its total boundary) by water and on the fourth by the towering Pyrenees Mountains that effectively seal it from the remainder of Europe to the north. To the south it comes within 14 1/2 miles of Africa at the Straits of Gibraltar and within 8 1/2 at the point between Tarifa and Cape Cires.

The Iberian coast tends to be mountainous, dropping precipitously to the water's edge, but varies according to region. Along the northwest it is rugged, steeply shelved, devoid of a coastal plain, and punctuated by long, branching inlets not unlike the fjords of Scandinavia. Elsewhere certain parts (especially near Valencia) exhibit extensive coastal plains, but the remaining coastline is high, rugged, and only occasionally indented by bays and small beaches. There are few sizable natural harbors. Thus, the Peninsula tends to be comparatively isolated from outlying lands. It is equally isolated internally. Within, as at its periphery, there are powerful natural barriers in the form of numerous mountain ranges that punctuate its surface and several large river basins that drain its otherwise arid countryside.

Much of the central part of the Peninsula is composed of high tableland ringed by mountains, the only plateau of appreciable size in Europe. This area, termed the Meseta, is both surrounded and subdivided by mountain ranges (Fig. 1). The Galician, Cantabrian, Iberic, and Baetic ranges (the latter including the Sierra Morena) encircle it; and the Central Range (including the Sierra de Gata, Gredos, and Guadarrama) and the

Toledo Mountains subdivide it into northern, central, and southern segments. The foregoing mountains are all either within or immediately peripheral to the Meseta; still others are external to it. Among them are the Vascocantabrian, Pyrenees, Catalan, and Penibaetic ranges (the latter including the Sierra Nevada, the highest mountains in Spain, with an elevation of 11,411 feet at one point).

The above distribution of mountain ranges is responsible for the drainage pattern (Fig. 1). The high points of the Peninsula describe a crude T, whose cross bar is a product of certain east-west directed mountains (*viz.*, the Cantabrian, Vascocantabrian, and Pyrenees ranges), and whose arcuate base is made of the Iberic and Penibaetic ranges. Land to the north of the cross bar drains into the Cantabrian Sea through a series of swift-flowing small rivers within V-shaped valleys; that to the south drains either westward into the Atlantic Ocean or eastward into the Mediterranean Sea, depending on position with respect to the base of the T. Among the more important westward-moving rivers are the Miño, Duero, Tajo, Guadiana, and the wide-basined Guadalquivir; and among the eastward are the Ebro (also quite wide-basined), the Júcar, and the Segura. Some of the larger rivers—as well as most of the smaller ones—are seasonal in nature, regularly alternating from dry to flooded. Associated with them are few lakes but many lagoons and dams.

CLIMATE

The climate of the Iberian Peninsula is influenced by the ocean currents that move clockwise adjacent to the Atlantic Coast; by the prevailing westerly winds that carry eastward the warm, moist effects of these water currents (resulting in moderate temperatures and rainfall); by the warm, dry airstream that occasionally blows from the Sahara; by the general lack of cloud cover and strong solar influence during summer; and by the various peninsular mountain ranges that modify the available heat, rainfall, and humidity. The interaction of these factors produces an extraordinarily varied climate.

The Atlantic Coast (mostly occupied by Portugal) has a maritime climate (Table I); the ocean effectively tempers the summer heat and winter cold, and makes available a rainfall that is abundant in winter but scarce in summer. This Atlantic influence extends northward into Spain's Galicia and eastward along the Cantabrian Coast almost as far as the Pyrenees, where it mixes with a European influence. The climate of Cantabrian Spain—relatively cool summers, mild winters, and a heavy rainfall throughout the year—is a product of this interaction, and is strangely reminiscent of that of Ireland.

The climate of the Mediterranean Coast is vastly different. Most parts have an equable climate not unlike that of the Italian Riviera, though milder in winter. Toward the south, this climate is increasingly modified by an African influence. This hot, arid influence is maximal along the southern slopes of the Sierra Nevada, where the weather is relatively cloudless, with light rainfall and summer drought offset by good irrigation from snow-fed streams from the adjacent mountains. (It is here that the warmest winters in all of Europe are encountered).

The climate of the interior of the Peninsula departs markedly from that of the coastal regions described above. The interior is best charac-

terized by the extremes of temperature that obtain between day and night and summer and winter. In general, the inland weather is hot and dry during summer, often bitter cold in winter, and rainfall scant, unreliable, and largely restricted to fall and spring. These general conditions, most characteristic of the northcentral, also prevail toward the south, though subject to a warming trend that is maximal near Sevilla, where the most uncomfortable summers in the Peninsula are encountered. These remarks pertain, of course, to the lower elevations of the interior, and not to the high mountainous areas, which are cold and snow-covered in winter and cool in summer. (The peaks of the Sierra Nevada and certain other ranges are snow-covered even in summer).

SOIL

Soil develops variously according to parent rock, relief, erosion, climate, vegetation, and other factors. Its characteristics and nomenclature are complicated; moreover, while it has considerable direct effect on vegetation, it has comparatively little on the Orthopteroidea (except for being the medium of the eggs of most species and the substrate of certain geophilous species). For these reasons, and because there proved to be little apparent correlation between the distribution of specific soil types and peninsular biogeographic regions, we shall not comment in detail on the Iberian soils. It is sufficient to note that the soils of the northwest, derived from cool, temperate forests, and somewhat enriched by manure, are good for agriculture; those in extremely arid regions underlain by rocks of high salt content are useless agriculturally; those of the mountains are variable, sometimes with a high humus content, and most often stony and infertile; those of the Guadalquivir and certain other river basins are alluvial and rich; and those of the remainder of the Peninsula—the bulk of the land—are dry forest soils of low humus content and only average fertility. (They are often developed in the direction of the red calcareous soils characteristic of Mediterranean lands, and, thus, are highly susceptible to erosion).

VEGETATION

The vegetation of the Iberian Peninsula is of singular importance in the lives of the orthopteroids that dwell there because it furnishes much of the food they eat and the shelter they utilize, and serves as the mediator of the gross climate to which they are subjected.

The Iberian flora is in good part a consequence of the area's 1) climate, 2) relief, and 3) soil. These factors are so varied from place to place as to result in unusual richness of plant species, biotic communities, and ecotones. The latter, which are essentially mosaic environments, tend to increase numbers both of individuals and of species of orthopteroids through the well-known «Principle of Edges.» Certain additional factors also contribute to the natural flora: the Peninsula's 4) geographic location and 5) its comparative isolation. Its strategic location (being the landbridge that formerly linked the continents of Europe and Africa) assures that the vegetation is a mixture of Palearctic, Mediterranean, Ethiopian, and other types; and its isolation is responsible for the development of an extraordinary number of autochthonous forms.

The above factors have shaped the natural vegetation, but significant parts of the Iberian flora are either disclimaxes or artificial associations. Their explanation is to be found in the fact that for centuries most of the Peninsula has been subjected to varying degrees of 6) land use (grazing, agriculture, lumbering, urbanization, *etc.*), with a resulting modification of the natural plant life. Woody communities have everywhere been reduced and converted into artificial savanna, grazing land, scrub, and other communities of more open, arid type. Consequently, the resulting modification of available heat, humidity, wind, and light has favored the development of bare ground, scrub, and grassland orthopteroids and inhibited that of their arboreal counterparts.

The interaction of these environmental factors, both natural and artificial, has produced a flora whose complexity makes difficult attempts to characterize it. However, our concern is with the orthopteroids, and it is possible to subdivide the Peninsula into arbitrary phytogeographic regions that prove of consequence to these insects. The regions here recognized are as follows (Fig. 2 and below):

Northern and Western Atlantic Coastal Forest Region (F)

This area, extending from central Portugal, along the northwest of the Peninsula, through the rocky coastal slopes of Cantabria, to the Pyrenees, is characterized by mild climate, heavy rainfall, and humidity persistent throughout the year. The climax community to develop under these conditions is forest of deciduous broad-leaved type, among whose trees are numbered oaks, alders, chestnuts, and poplars. There is also considerable development of pines. Between these lush forests, especially in the valleys, are extensive, fertile meadows dominated by grasses and composites and green all year long. The mesic conditions that typify the entire region are best developed in Cantabria and tend to disappear southward toward the valley of the Duero.

Southern and Eastern Coastal Region (C)

The southern and eastern coasts of the Peninsula have features of similarity. Their climate is mild in winter and warm in summer—either dry or humid—and citrus fruits are grown throughout. However, they exhibit significant differences in vegetation and climate from place to place. The southern Atlantic Coast has a warm, humid climate supporting the growth of cultivated citrus fruits, olives, figs, almonds, grapes, and vegetables, as well as palms. The southern Mediterranean Coast as far north as Alicante (about half way up) has a hotter, more arid climate unmistakably African in character, where maximal development of esparto grass, palms, sugar cane, bananas, agave, and prickly pear is supported. The northern Mediterranean Coast (Alicante to Gerona) features a more equable climate and conditions more typically Mediterranean; here are found woods of evergreen oak, cork trees, pines, palm groves, and thickets.

Steppe Region (S)

Extensive steppe, otherwise unique in western Europe, appears discontinuously within the Peninsula. It is essentially an area of short grass cover but includes some scattered xerophytic shrubs. It occurs where the soil is thin, of relatively high sodium chloride content, and the climate is hot and dry. Such areas are characterized by flat or gently rolling, infertile terrain and by absence of trees and scarcity of shrubs. The typical vegetation —of largely halophytic type— is from the herb families *Gramineae*, *Labiatae*, *Plumbaginaceae*, and *Salsolaceae*.

Montane Region (M)

The numerous mountains of the Peninsula occur at variably separated locations. Their lower levels have a flora that merges almost imperceptibly with that of the surrounding lands. At these elevations they support the growth of trees (pines, firs, beeches, birches, *etc.*) whose type varies according to geographic location and exposure. The high elevations, in contrast, tend to support a fairly characteristic alpine flora of mosses, lichens, grasses, crucifers, and a few dwarf shrubs. The peaks are snow-covered during winter, and some northward-facing slopes may be so covered even during summer. The orthopterous fauna, together with the flora, is characteristic.

Mediterranean Region and Its Central and Meridional Subregions

The extensive Mediterranean Region of the Peninsula includes the Meseta, southern Spain, and the Mediterranean slope, except where occupied by steppe, mountain, or coast. The flora is characterized by evergreen trees (especially evergreen oak, cork, laurel, and pine); thickets of cistus, thyme, broom, rosemary, and heaths; esparto grass; and some bulbous monocots. The overall region is readily divisible into two zones: the *Central* and the *Meridional Subregions*, whose mutual boundary is the Central Mountains. The Central Subregion (to the north of these mountains) is a sun-scorched, wind-swept plateau with little woodland, except for thin rows of poplars along the water courses. The common trees are pines, evergreen oak, and cork, with the above-mentioned poplars along the river banks, but scattered thickets of cistus and other shrubs actually occupy a much greater extent of the land than do trees. The climax vegetation is mixed and deciduous forest (though not the extensive type found in most of western Europe). In the Meridional Subregion (to the south of the Central Mountains) the trees and thickets tend to be similar to those in the Central Subregion, but plant species characteristic of a transition to tropical conditions (especially agave and prickly pear) are introduced among them. (It is interesting to note that the Meridional Subregion tends to coincide geographically with olive tree cultivation, largely lacking in the Central Subregion).

COMPOSITION OF THE ORTHOPTEROUS
FAUNA

The Orthopteroidea of the Iberian Peninsula have been under intensive investigation since well before the turn of this century. The taxonomic researches initiated by IGNACIO BOLÍVAR URRUTIA were later continued by his son, CÁNDIDO BOLÍVAR PIELTAÍN, and more recently by the co-author of this report, EUGENIO MORALES AGACINO. Largely through their efforts an important collection of orthopteroids numbering approximately 150,000 specimens has been amassed at the Instituto Español de Entomología, Madrid, and numerous publications have resulted. The magnitude of this past research suggests that the Iberian fauna should be well-known, but, in fact, because of its complexity much needed information is still unavailable.

For purposes of this report a provisional list of Iberian *Orthopteroidea* was assembled, based primarily on the Instituto collections, as modified and expanded by data from the recent literature. (This list of 324 species within 141 genera and 38 subfamilies appears in Table III). It was then compared with published lists of other faunae, which (on the basis of present-day distribution of the genera in question) enabled generalization on the origin of the Iberian forms. The complete results appear in Table IV, and a brief synopsis follows:

<i>World Distribution of Iberian Genera</i>	<i>Total No. of Genera</i>
<i>Mediterranean</i> (including meridional Europe, North Africa, Asia Minor, parts of western Asia, or various combinations thereof)	44
<i>Palaearctic</i> (including Europe, with or without temperate Asia, and the Mediterranean, with or without North Africa)	39
<i>Cosmopolitan</i> (or at least globally widespread)	21
<i>Endemic</i> (or essentially endemic)	8
<i>Ethiopian</i>	7
<i>Atlantic</i>	1
<i>Various combinations</i> of the above	21

The above tabulation suggests that the Iberian fauna is a composite of several faunal elements including Palaearctic, Mediterranean, Ethiopian, endemic, cosmopolitan, and Atlantic genera, as well as others distributed according to various combinations of the foregoing. Discussion and illustration of each (except the cosmopolitan and the combined, on which commentary is pointless because of their ubiquity) is essential to this presentation, but the selection of the particular representatives to be cited is difficult. Many, many species could be mentioned with respect to each category, but because of space limitations we shall confine our attention to genera and other larger groups and to species of especial interest selected, whenever possible, from throughout the various families of Orthopteroidea.

Palaearctic Faunal Elements

A total of 39 Iberian genera are essentially *Palaearctic* in distribution. They occur variously in one or more parts of Europe, as well as in the Mediterranean zone, and often are found in temperate Asia. The presence of this Palaearctic (essentially Euro-Siberian) element within the Peninsula is of interest because there is presently but one connection between the Peninsula and Europe, a difficult mountainous junction, the Pyrenees, shared with France. Comparison of the present list of Iberian orthopteroids with that of CHOPARD (1951) for France shows that almost 49 % of all Iberian species are shared with France, and most of them are Palaearctic forms. This strong Palaearctic influence was noted earlier by CAZURRO (1888); of the 439 species of Orthopteroidea he attributed to Europe, 243 were represented within the Iberian fauna, and, of his 113 genera, 92 were Iberian. Though his figures are hopelessly outdated, they indicate something of the relationship between the Palaearctic fauna and its Iberian subdivision.

The existence of the Pyrenees Mountain connection between the Iberian Peninsula and France, the fact that the two land areas are almost equal in size, together with the availability of a comparatively up-to-date report on the orthopteroids of that more «typical» European country, afford the means to make a useful comparison (Table II). Chopard's list of French *Orthopteroidea* includes approximately 223 species distributed within 109 genera and 32 subfamilies. Comparing these figures with those for the Iberian fauna (approximately 324 species within 141 genera and 38 subfamilies) reveals a numerical disparity in favor of the latter, much of which is accounted for by the subfamilies *Ephippigerinae* (11 spp. in France vs. 42 in Spain and Portugal), *Pycnogastrinae* (0 spp. vs. 6 spp.), *Gryllinae* (8 spp. vs. 27 spp.), *Truxalinae* (50 spp. vs. 59 spp.), *Oedipodinae* (22 spp. vs. 27 spp.), and *Pamphaginae* (0 spp. vs. 16 spp.). Perhaps the disparity is best illustrated by the fact that over 91 % of all French genera are present in the Peninsula, yet numerous peninsular genera are lacking in France. It is clear from the above and from examination of other European faunal lists that the Iberian Peninsula has a representation of Palaearctic orthopteroids that is typical of most western European countries and about equal to that of France. It also has many additional elements, but that will follow. Let us turn to a few examples of the Palaearctic assemblage:

The cockroach genus *Ectobius* —though almost peculiar to Europe— actually has two centers of distribution, a great one in Europe and a smaller one in south and central Africa. There are three of the European assemblage of species in the Iberian Peninsula, of which the wild cockroach *E. lucidus* (HAGB.) is representative.

The katydid genus *Meconema* is Palaearctic in distribution, occurring in Europe and temperate Asia. One species, *M. thalassinum* (DEG.), is found throughout Europe and in the entire north of the Peninsula.

The powerful shield-backed katydids of the genus *Decticus* number about one-half dozen species in the world. They are essentially European in distribution (being found from Scandinavia to the Mediterranean), but some species extend to western Asia. There are two species in the Iberian Peninsula: *D. verrucivorus* (L.) and *D. albifrons* (FAB.).

The large, handsome field cricket *Gryllus campestris* L. has a distri-

bution extending throughout Europe to western Asia and down to North Africa. It is common throughout the Peninsula.

The Palearctic orthopteroid fauna is a mixed lot including geographically and ecologically widespread elements as well as restricted ones. Among the ecologically restricted might be listed certain boreo-alpine and certain desert forms. The boreo-alpine representatives are obligate dwellers of high mountain. Sometimes they are highly localized on a given mountain range, but sometimes their distribution extends from the mountains of Asia all of the way across Europe to the Iberian Peninsula. The desert forms, in contrast, extend from the arid stretches of the Sahara across Arabia deep into the heart of Asia; necessarily they are lacking in Europe except in the Iberian Peninsula.

The catantopine genus *Podisma* is included among the *boreo-alpine elements* of the Peninsula. It is composed of a number of stout, short-winged or wingless montane grasshoppers. There are two species occurring in the highest ranges of Spain: *P. ignatii* MOR. (with three localized subspecies) and *P. pedestris* (L.). In the Peninsula the latter is found only in the meadows of the Pyrenees, but elsewhere is widespread from Siberia to the northern and central mountains of Europe. A related spine-breast, *Miramella alpina* (KOLL.), is found in all of the high mountains of Europe, and in Spain occurs in the Pyrenees from Navarre to the Mediterranean Sea.

Gomphocerus sibiricus (L.) (= *Aeropus sibiricus* L.) is also boreo-alpine in distribution. It is a slant-faced grasshopper easily recognized by the inflated fore tibiae, clubbed antennae, and tumid pronotum of the male sex. It is typical of high mountains from west Siberia to the Atlantic Coast. It has a subspecies, each, in the Caucasus, Greece, the Alps, the Pyrenees, and central Spain; and two other species of the genus occur in Armenia and east Siberia, respectively. The Spanish representatives are *G. s. hispanicus* Uv. (in the Central and Cantabrian Mountains) and *G. s. pyrenaeicus* Uv. (in the Pyrenees).

Among the desert dwellers of the Palearctic Realm is *Heterogamodes bifoveolata* (BOL.). It is a member of the *Polyphaginae*, a subfamily restricted to the desert country of the Old World (except for a few species in North America). Females only of this apterous, flattened cockroach of subcircular outline are found in dunes along the southeastern coast of Spain, and both males and females of the insect occur throughout the deserts of North Africa over into Asia. This discrepancy in occurrence of the two sexes can possibly be explained by insufficient collection. However, it is more likely explicable on the basis of parthenogenesis, for various cases are known of species becoming parthenogenetic (a defense mechanism against unfavorable conditions) toward the extremes of their range.

Mediterranean Faunal Elements

The single most important element composing the Iberian orthopteroid fauna is the *Mediterranean*. Its total number of genera (44) outnumbers that of any other faunal element. The Mediterranean subfauna was produced largely as a result of interaction between the Palearctic and Ethiopian faunae, and today occurs throughout the lands bordering the Mediterranean Sea. Here there is a mild, subtropical climate and a

characteristic soil, which have combined to create distinctive, comparatively uniform environmental conditions. In response to these favorable conditions numerous orthopteroids have evolved and settled throughout, and many find their home in the Iberian Peninsula. Some of these Iberian species range broadly throughout the entire Mediterranean zone; some are restricted to particular parts of it (*e. g.*, meridional Europe, or Africa north of the Sahara Desert, or Asia Minor, or southwestern Asia, or their subdivisions); while still others are distributed according to various combinations thereof.

Prominent among the Mediterranean forms in the Peninsula are certain North African elements. They merit further discussion. The separation of the Peninsula from North Africa is a narrow one (only $8\frac{1}{2}$ miles at one point), but for terrestrial organisms with the vagility of most orthopteroids this stretch of water poses an undeniably effective barrier. It seems impressive, therefore, that the Iberian fauna includes as many North African representatives as it does; approximately 56% of all North African genera² occur in Spain and Portugal, and no less than 37% of all Iberian species are also found in North Africa. This is despite the fact that the Peninsula and North Africa have been separated geographically since the Upper Miocene, when the Straits of Gibraltar were formed.

In terms of number of species the North African fauna (with 510 spp.) is greater than is the Iberian fauna (with 324 spp.). However, this disparity is not especially great in view of North Africa's more southern location, more tropical nature, and its direct land connection with a vast, richly inhabited continent to the south, and especially in view of the Peninsula's isolation. Moreover, the Iberian fauna actually enjoys an advantage in the following groups (Table II): *Decticinae* (25 North African spp. vs. 37 Iberian ones), *Ephippigerinae* (36 spp. vs. 42 spp.), *Pycnogastrinae* (1 sp. vs. 6 spp.), *Tetrigidae* (5 spp. vs. 8 spp.), and *Truxalinae* (32 spp. vs. 59 spp.). This good representation of North African forms, together with an excellent one of European taxa, makes the peninsular fauna a large, varied one indeed.

It must be remembered that the North African faunal element discussed above is *not* Ethiopian. It is Mediterranean and, thus, part of the Palearctic assemblage. Not surprisingly, it has much greater affinity to the Iberian fauna than to that of the vast lands south of the Sahara Desert. This results from the fact that the Sahara acts as a natural barrier separating North Africa from the diversified Ethiopian Realm to the south.

Some examples of the Mediterranean faunal element of the Peninsula follow:

There are ten species of the Mediterranean cockroach genus *Phyllodromica* in the Iberian Peninsula. One of the most widespread is the small, wingless *P. subaptera* (RAMB.), a wild species found throughout most of the Peninsula. It is also recorded from Dalmatia, Sicily, Corsica, and France.

The walking-stick genus *Bacillus* is localized in the Mediterranean region. One species, *B. rossii* (FAB.), dwells on shrubs in hot places both in North Africa and in Mediterranean Europe, all the way from Syria to Spain. As it approaches France from the Near East the males become increasingly uncommon, which has led to speculation that the insect is in part parthenogenetic. The peninsular representatives of the species live near Catalonia, close to the French border.

The mantids of the genus *Ameles* are essentially Mediterranean in distribution. They number five species within the Iberian Peninsula, some rare or localized, others widespread. Among the latter is *A. abjecta* (CYR.), which is recorded from Mediterranean Europe (France, Italy, Sicily, Corsica, and Sardinia) and from North Africa.

Odontura, a genus of delicate-bodied phaneropterine katydids, is known from North Africa, Sicily, and the Iberian Peninsula. One of the four Iberian species, *O. stenoxypa* (FIEB.), is located in Sicily, Sardinia, Tunisia, and the Balearic Islands of Spain. Another, *O. aspericauda* RAMB., lives in low mountain situations extending from the south of Spain along the entire eastern coast to the Pyrenees. Still another, *O. macphersoni* MORALES, is endemic to the North Meseta as far west as Galicia.

The katydids of the genus *Saga* are large, flightless insects of great power and predacious habit. They are found in Asia Minor and through the general eastern Mediterranean region, except for one species, *S. pedo* (PALL.), that extends through the Dalmatian Islands, Bohemia, Austria, Italy, southern Switzerland, France, and into central Spain. In France and Spain it is scarce and represented only by tetraploid females, which seems another case of parthenogenesis occasioned by the species reaching the extremes of its range.

There are two species of the ephippigerine genus *Uromenus* in southern France and only one, *U. rugosicollis* (SERV.), in Catalonia (northern Spain). The distributional patterns of the genus suggest that it dispersed from North Africa (the area with the bulk of its species) into Spain counterclockwise through Sicily, Corsica, Italy, and finally France. Should this be the case, it is a different route than the direct, clockwise one (through Gibraltar) presumably taken by most orthopteroids spreading northward from North Africa.

The sciobine complex of crickets are peculiar gryllines exclusive to the Mediterranean region. Their males are characterized by a more or less strongly developed sexual helmet, or veil, of unknown function appearing after the last molt. There are two genera in the Peninsula, *Thliptoblemmus* and *Sciobia*. The former genus includes *T. caliendrum* (FISCH.), found both in Morocco and in southern Spain near the coast, and *T. barbarus* (SAUSS.). The latter genus includes a single species, *S. lusitanica* (RAMB.), practically ubiquitous within the Peninsula, and probably also found in Morocco.

The pamphagine genus *Acinipe* has representation in North Africa, Spain, and Sicily. Its members are robust insects characteristic of dry places, chiefly desert and mountain. There are five species in the Iberian fauna, the most common of which is *A. hesperica* RAMB., one of the largest-bodied grasshoppers found in Europe. It occurs in Algeria, Tunisia, Morocco, and Spain. In Spain it is restricted to the southeastern coast.

The genus *Platyphyma* includes the small, brachypterous grasshopper *P. giornae* (ROSSI) (= *Pezotettix giornae* (ROSSI)), whose distribution is purely Mediterranean. It is ubiquitous within the Iberian Peninsula, and is found throughout the Mediterranean zones of Europe, North Africa, and Asia Minor.

Dociostaurus maroccanus (THUNB.), the classical Mediterranean plague locust, occurs in arid situations in many parts of Spain and Portugal and elsewhere throughout meridional Europe and North Africa over into southwestern Asia. In the past the gregarious phase of this insect has reached outbreak populations in Spain, southern France, Corsica, Cyprus,

Algeria, and Morocco. Three other species of the genus are known from the Peninsula.

Ethiopian Faunal Elements

The Iberian species of so-called «African» origin are, in reality, a mixed lot whose representatives include tropical, savanna, montane, Mediterranean, and many other forms. The Mediterranean representatives have already been treated, as they properly belong elsewhere (with the Palearctic). We shall concentrate below on those comparatively few forms that are truly *Ethiopian*, dwelling south of the Sahara Desert, a natural barrier separating the Ethiopian Realm from Palearctic North Africa. The numbers of such taxa are not great, including a total of only seven genera that extend northward to the Iberian Peninsula, but certain of the species are of especial interest.

Sphodromantis is a tropical Ethiopian genus with a species extending into the Iberian Peninsula. This handsome insect, *S. viridis* (FORSK.), the largest mantid that occurs anywhere in Europe, is found in Morocco, Algeria, and Tunisia, and also in Egypt, Palestine, Syria, and Anatolia, as well as in the Peninsula, where it is restricted to «Andalusia».

The phaneropterine genus *Tylopsis* includes a total of ten species. These thamnophilous katydids are peculiar to the Ethiopian Realm except for one species, the well-known *T. lilifolia* (FAB.), which occurs throughout the Mediterranean lands over into southwestern Russia. In the Peninsula it is widespread, inhabiting all parts except the North Meseta and the several steppes.

Brachycrotaphus tryxalicerus (FISCH.), a slender, delicate slant-faced grasshopper, is typical of African savanna. It is entirely absent from North Africa, yet is found in Spain and Sicily. In its peninsular distribution it is somewhat localized in grassy places along the eastern Mediterranean coast.

The entire subfamily *Truxalinae*, as interpreted in the strict sense of UVAROV (1966), is Ethiopian. It includes a few genera of extreme slant-faced grasshoppers occurring mainly in the tropical and subtropical grasslands of Africa. Its genus *Truxalis* is of interest because certain species of it penetrate into Mediterranean Europe and southwest Asia. Among them is *T. nasuta* (L.), known outside Africa only from the southernmost parts of Europe. In the Peninsula it must be classed as ubiquitous, though best developed in the Mediterranean regions of Spain.

Endemic Faunal Elements

Interactions among the general Palearctic, Mediterranean, Ethiopian, and other faunal elements, within the framework of a constantly varying physical, climatic, and biotic environment and powerful barriers, have produced within the Peninsula a large number of autochthonous species. Comparison of the peninsular taxa with those of the neighboring areas (especially France and North Africa) shows that approximately 36 % of the species and 12 % of the genera are not found in lands adjacent to the Peninsula. Most of these insects can be presumed to be endemic to the Peninsula. (A list appears in Table III). Some of these apparent endemics are found throughout one or more major regions of the Peninsula, while others are highly localized within a small area of a given province.

It is clear, therefore, that the Iberian fauna is a large, varied one both because of its mixture of species and groups from without and because of endemism from within.

Among the noteworthy *endemics* or near endemics are the following:

The Ethiopian genus *Leptynia* has a species, *L. hispanica* (BOL.), that is practically endemic to the Iberian Peninsula. This walking stick lives throughout most of the Peninsula, and extends into southern France, where the male sex becomes uncommon, suggesting the limits of range. It is not recorded from North Africa.

The cockroach *Phyllodromica baetica* (BOL.) is highly localized in certain mountainous areas of southern Spain. It has been recorded only from the localities of Lanjaron, Bacares, Alcaraz, and Siles, where it is scarce. *P. princisi* FERN., a closely related species, is found in the same general area, in some of the same localities, and at the same time of year, but is even more scarce and localized. The two are undoubted species, for only recently the Iberian representatives of their group were revised.

Baetica ustulata (RAMB.), an endemic genus and species of katydid, is found only in the Sierra Nevada of southern Spain. This insect is a member of the *Ephippigerinae*, a subfamily that is purely Mediterranean in distribution and typically Iberian.

Steropleurus stali BOL., like *B. ustulata*, is an endemic ephippigerine, but is distributed somewhat more widely. It occurs in the Central Mountains and Meseta perhaps as far west as into Portugal. Its genus is a large one in the Peninsula, including 19 of the estimated 35 species of the world.

Approximately ten species of the field cricket genus *Grylloides*—most of which are endemic—are presently recognized from the Peninsula, but the group is now undergoing revision, and may well change in composition.¹⁰ *Grylloides escalerae* BOL., typical of the known endemics, resembles *S. stali* (above) in its distribution (*viz.*, along the slopes of the Central Range into Portugal).

The katydid *Tettigonia hispanica* (BOL.) is a member of a typically Palearctic subfamily, the *Tettigoniinae*. However, this particular species is much more restricted. It is native to the Central Mountains of the Peninsula, where it perches on stout herbs from which it catches its food, insect prey.

Paracaloptenus bolivari Uv., a brachypterous, spine-breasted grasshopper of peculiar form, is restricted to the Franco-Catalan Pyrenees, where it is common in meadows.

Omocestus, a genus of gomphocerine grasshoppers from Europe, North Africa, and Palearctic Asia, has among its species a series (perhaps a separate subgenus) that has arisen in association with the Iberian mountains. Each of these localized forms is brachypterous or almost so (especially in the female sex), and is restricted to a particular mountain range or even to one mountain. Examples include *O. femoralis* BOL., from arid places in one locality of Jaen Province in the south; *O. navasi* BOL., from mountains near Huesca, close to the French border; *O. antigai* BOL., from mountains in nearby Catalonia; *O. minutissimus* (BOL.), one of the smallest of grasshoppers, from elevated situations in the north-central Peninsula; *O. burri* Uv., from arid places in one locality of Murcia Province along the southeastern coast; *O. bolivari* CHOP., from meadows on the high peaks of the Sierra Nevada; and *O. uhagoni* (BOL.), from the Central Mountains.

Other Faunal Elements

Further examination of the Iberian fauna discloses elements in addition to those already mentioned. For example, there are 21 *cosmopolitan or essentially cosmopolitan* genera, whose presence within the Peninsula is no accident, for they are distributed throughout major parts of the world. There are 21 genera whose distributions represent various combinations of the preceding. Finally, there is at least one genus, as well as a number of species, that can be considered *Atlantic* in distribution.

Among the Peninsula's *Atlantic elements* is *Apteromantis aptera* (FUENTE). It is a wingless mantid with conical, prolonged compound eyes. It has an essentially Atlantic (possibly western Mediterranean?) distribution in Atlantic parts of Morocco and the Iberian Peninsula. In the latter it is found in the middle south, where it is always scarce. Closely related is another Atlantic (possibly Paleo-Mediterranean?) form, *Pseudoversinia occidentalis* BOL., from the Canary Islands, Morocco, and the southern Peninsula.

The meconemine katydid genus *Canariola* is classical to the Canary Islands (where there are two species), but recently a third species, *C. emarginata* NEWMAN, was discovered in southern Spain. This interesting insect is localized in the Sierra de Cazorla, near the Guadalquivir, an essentially Atlantic (possibly Paleo-Mediterranean?) distribution.

Leptopternis imitans (BRUNN.), a small oedipodine grasshopper, is known from arid places in southern Portugal and Atlantic coastal Spain (*viz.*, Huelva, Cadiz, Sevilla, Chiclana, and as far east as Granada). This distribution, an undoubted Atlantic one, is quite different from that of most other members of the genus, whose ranges are essentially North African and Southwest Asian.

Habitat Occupancy

Table III contains information on the habitat occupancy of Iberian orthopteroids. However, the large number of species involved, their complex ecological relationships, and the comparative incompleteness of these data prevent use of the Table in detailed analysis of habitat. However, these data may be supplemented by the habitat data of Table IV (though the latter represent generalizations not necessarily applicable to all Iberian species), which are given brief consideration below.

The *mountains* of the Peninsula constitute the single most important environment of the Iberian genera, owing both to extensive coverage of the Peninsula's available land and to a diversified nature. The various Iberian ranges differ greatly in elevation, soil, climate, exposure, and other environmental factors, and support the growth of distinctive meadow, woodland, scrub, bare ground, rock, alpine, and other communities occupied by an orthopterous fauna that proves to be principally Palearctic in origin. The numerous grasslands of the Peninsula (meadow, steppe, savanna, and other communities) are almost equal in importance to the mountains as a habitation for orthopteroids, and also combine with mountains to offer to these insects an often-used habitat, *viz.*, alpine meadows. The faunistic origin of the grassland genera is varied, but especially common among them are representatives of the non-Mediterranean Palearctic fauna. Much less important are the *woodland* and the

desert and certain related communities (*viz.*, dunes, rock, bare ground, *etc.*), which are, each, the habitat of a number of Iberian genera.

Table IV contains mixed data, dealing (1) with the above-mentioned major communities (mountain, grassland, forest, desert, *etc.*) frequented by the orthopteroid genera of the Peninsula and (2) with the insects' habits within those habitats. To this point we have discussed only the first aspect, habitat, and have ignored the second, habits, though they too are important. Let us turn to habits.

The majority of the Iberian genera prove either *thamnophilous* or *graminicolous*. The thamnophiles occur on the various kinds of shrubs characteristic of scrub, woodland ecotonal, and other communities. They include among their members representatives of the several faunal elements, particularly the Mediterranean. The graminicoles live on the grasses of meadow, steppe, savanna, dune, and other semiarid places throughout the Peninsula. This habit is pronounced within the non-Mediterranean Palearctic fauna of the Peninsula and, above all, within the more limited Ethiopian fauna. A smaller number of Iberian genera prove *geophilous*, living in association with leaf litter, stones, or other debris, or having fossorial or related habits. An even smaller number is essentially *hygrophilous*, living on or among dense, lush herbage or in swamp or stream-edge vegetation. This habit is especially characteristic of the cosmopolitan assemblage of orthopteroids. Finally, a limited number of genera of *domestic habit* must be mentioned. Faunistically they are related to the geophiles, and their transition from association with leaf litter and debris to one within man's dwellings must have been relatively easy in view of the thigmotaxis they share with the geophiles.

DISTRIBUTION OF ORTHOPTEROIDS WITHIN THE PENINSULA

The geographic distribution of the Orthoptera and their allies within the Iberian Peninsula has been treated before; CAZURRO discussed it in a preliminary way in 1888. However, more than three-quarters of a century have since elapsed, making this early treatment obsolete. The considerable research done since then offers a reasonable basis for the restatement that is here attempted.

Distributional Patterns

Two types of information are necessary to analyze distributions: 1) a list of species, and 2) locality data. Both proved obtainable through the use of the collections of *Orthopteroidea* of the Instituto Español de Entomología, Madrid. The named specimens of that large, relatively complete collection provided a basic list of species and groups, which was modified and expanded by incorporation of information from the recent literature. The result was a provisional list of 324 species distributed within 141 genera and 38 subfamilies. The locality data of each recorded species were then plotted against the Peninsula's biogeographic regions (Fig. 2); maps were drawn and compared; and a tentative classification of distributions was erected. This basic information, together with remarks on possible endemism and general comments, is presented in Table III.

The determination of faunistic boundaries is critical to the presentation that follows. The biogeographic regions were first roughed out

according to preconceived ideas based largely on plant distributions, barriers, and climatic zones, and were then tested against, and modified in general accordance with, the encountered orthopteroid distributions. The resulting regions are admittedly approximations, and can possibly be improved upon in ways to be mentioned later. Moreover, the orthopteroids that dwell within them can be expected neither to occur in all parts nor to overlap and coincide with one another in range; indeed, numerous species were found more restricted than their region, and overlap only in part with other —though not all— species that inhabit the same region. This fact is a simple consequence of the discontinuous nature of the regions themselves (especially mountain and steppe.)

At the outset might be mentioned certain complications to the data of Table III. The insect specimens on which the study is based are a product of random collecting over the years by numerous entomologists. It is inevitable that some species common in a given area might not be recorded from there, and others recorded there, but actually rare in that place, might be taken as common, a tendency exaggerated when the records are based on few specimens. The only recourse in preparation of this report was to identify distributions based on comparatively few specimens. The arbitrary figure here chosen is 25 or fewer specimens of a given species, whose distributions are regarded potentially unrepresentative, except in cases where the species is highly localized. Indeed, this figure could well have been set higher, for series of many more than 25 specimens sometimes prove unrepresentative.

This report generalizes with respect to region and habitat. The six regions plotted on Fig. 2 are, at best, gross generalizations and the linear boundaries between them formalistic and unnatural. For example, Central 2 is a region including mixed and deciduous forest, steppe, scrub, mountain, marsh (near rivers), and various other natural and semi-natural associations of vegetation, as well as cultivated fields, pastures, plantations of olive and other trees, and urban situations. Clearly, error is inherent in any adopted system of regions, for they are necessarily arbitrary and assume that the orthopteroids dwell throughout them, which they do not.

There are two further weaknesses, *viz.*, avoidance of use of the recognized subspecies of the Peninsula and the incompleteness of the list of species. Though both are minor considerations, they require mention. Numerous subspecies are known from the Peninsula, and their use would have increased the precision of the study; however, it would have done so at the price of complicating an already complicated subject without contributing importantly to the discussion —hence the deliberate omission of practically all subspecies.

The new, still unrecognized species of the Peninsula constitute an unavoidable weakness. A reasonable estimate is that the provisional list of species included in Table III will eventually have to be expanded by 10 to 20 % to accommodate all presently unrecognized species. This eventuality will require many years to obtain, and when it does should not invalidate the results of the present study. This assessment is based on the fact that the peninsular *Orthopteroidea* are already comparatively well-known, which makes it likely that most new species will be localized endemics belonging to highly variable groups; as such, they are not essential to the present discussion. The few definitive studies that in recent years have been undertaken on problem groups have produced

exactly that result. J. DE A. FERNANDEZ, for example, in his 1962 revision of the cockroach group *Ectobiinae* confirmed 10 existing species and described three new ones from the Peninsula; the previously known forms proved to be widespread insects that long have been recognized, but each of the new ones he described was a localized endemic.

We can conclude that the data here given, though incomplete, are better than have been available before, and that in most cases they will contribute to an improved understanding of the biogeography of the *Orthopteroidea*. However, should they do no more than indicate areas especially in need of research they will have served their purpose.

We can now undertake a statement of Iberian orthopteroid distributional patterns using a short-hand method. The system used is based on the biogeographic regions explained in Fig. 2. They include, among others, the following regions: the Northwest Forest Region, which is indicated by F; particular mountain ranges by M1A (the Pyrenees), M1B (the Galician, Cantabrian, and Vasco-cantabrian Mountains), M2B (the Central and certain other ranges), and M3 (the Penibaetic and related mountains); the North Meseta and adjacent areas by Cn 2; most of «Andalusia» by Mer 2; the northern Mediterranean Coast by C1; the southern Mediterranean and Atlantic Coasts by C2; and particular steppe regions by S1, S2, and S3, respectively.

The distributional patterns recognized tentatively are as follows:

Synopsis of Iberian Orthopteroid Distributions.^{3 & 9}

I. *Mediterranean & South Atlantic Coasts & Interior.* 51 spp.

a. *Entire Mediterranean & South Atlantic Coasts & Interior* (16 spp.)

- Pattern Ia1. C1 & 2, Cn 2, Mer 1 & 2, M3, & S3, with or without M1A, M2B, S2.
 Pattern Ia2. C1 & 2, Cn 2, & Mer 2, with or without M2B, M3, S2 & 3.
 Pattern Ia3. C1 & 2, Mer 1 & 2, M2B & 3, & S2 & 3.
 Pattern Ia4. C1 & 2, Mer 2, M3, & S3, with or without M2B.
 Pattern Ia5. C1 & 2, Mer 1, Cn 2, & S3, with or without M1A, M2B, M3, S1, S2, Cn 1.
 Pattern Ia6. C1 & 2, Mer 1, M1A, Cn 1, & M3.
 Pattern Ia7. C1 & 2 & Cn 2.
 Pattern Ia8. C1, S3, & Mer 1.
 Pattern Ia9. C1, S3, Mer 2 & M3, with or without M2A & 2B.

b. *South Mediterranean & South Atlantic Coasts & Interior* (24 spp.)

- Pattern Ib1. C2, Cn 2, Mer 1 & 2, M3, & S2, with or without M2B & S3.
 Pattern Ib2. C2, Cn 2, Mer 2, M1A, 2B, & 3, S2 & 3.
 Pattern Ib3. C2, Cn 2, & Mer 2, with or without M1B, 2B, & 3, S2, S3.
 Pattern Ib4. S3 & 2, Cn 2, & Mer 2.
 Pattern Ib5. C2, S3, Mer 1 & 2, & M2A & 3.
 Pattern Ib6. C2 &/or S3, & Mer 2, with or without M2B & 3.
 Pattern Ib7. S3 & Cn 2.

c. *North Mediterranean Coast & Interior* (11 spp.)

- Pattern Ic1. C1, Cn 2, Mer 1 & 2, & either M1A or Cn 1, with or without M2B & S1 & 2.
 Pattern Ic2. C1, Cn 2, Mer 2, M2B, & S2, with or without M2A & 3, S3.
 Pattern Ic3. C1, Mer 2, S2, & M3.
 Pattern Ic4. C1 & Cn 2, with or without Mer 1, Cn 1, M1A, 2A, & 2B.

II. *Mediterranean & South Atlantic Coasts; No Interior.* 32 spp.a. *Entire Mediterranean & South Atlantic Coasts* (5 spp.)

- Pattern IIa1. C1 & C2, with or without S3.
 Pattern IIa2. C1 & S3.

b. *South Mediterranean & South Atlantic Coasts* (26 spp.)

- Pattern IIb1. C2, with or without M3 & S3.
 Pattern IIb2. S3.

c. *North Mediterranean Coast* (1 sp.)

- Pattern IIc1. C1.

III. *North & West Atlantic Coast & Interior, With or Without Mediterranean Coast.* 31 spp.a. *North & West Atlantic Coast & Entire Mediterranean & South Atlantic & Interior* (8 spp.)

- Pattern IIIa1. F, C1 & 2, Cn 2, Mer 2, & M3, with or without M2B, S2 & S3.
 Pattern IIIa2. F, C1 & 2, Mer 1 & 2, M1A, & Cn 1.
 Pattern IIIa3. F, C1 & 2, S3, Mer 2, & M2A & 3.
 Pattern IIIa4. F, C1 & 2, Cn 2, & Mer 1, with or without M2B, Cn 1, & S3.
 Pattern IIIa5. F, C1 & 2, S3, and M3, with or without M1A & 2B.

b. *North & West Atlantic Coast & South Mediterranean & South Atlantic Coasts & Interior* (6 spp.)

- Pattern IIIb1. F, C2, Cn 2, Mer 2, & M1A, 1B, 2B, & 3, with or without Cn 1, Mer 1, & M2A.
 Pattern IIIb2. F, C2, Cn 2, Mer 2, & M2B.
 Pattern IIIb3. F, C2, Mer 1 & 2, & M1A, 2B, & 3.
 Pattern IIIb4. F, C2, & Mer 2, with or without M1A, 2B, & 3, C1, & S3.

c. *North & West Atlantic Coast & North Mediterranean Coast & Interior* (6 spp.)

- Pattern IIIc1. F, C1, Cn 2, Mer 2, & M2B.
 Pattern IIIc2. F, C1, Cn 2, Mer 1, & M1A, 2B, & 3, with or without M1B.
 Pattern IIIc3. F, C1, Cn 2, & M1A, with or without M1B.
 Pattern IIIc4. F, C1, Mer 1, & M1A.

d. *North & West Atlantic Coast & Interior* (11 spp.)

- Pattern IIIId1. F, Cn 2, Mer 1 & 2, & M1A, 2B, & 3, with or without S3.
 Pattern IIIId2. F, Cn 2, Mer 2, & M2B, with or without M1B & 3, & S2.
 Pattern IIIId3. F, Mer 1 & 2, M1A & 3, & Cn 1.
 Pattern IIIId4. F, Cn 2, & M1A, 1B, & 2B, with or without Cn 1.
 Pattern IIIId5. F & Cn 2, with or without M1B & 2B.

IV. *North & West Atlantic Coast, With or Without Mediterranean Coast; No Interior.* 23 spp.a. *North & West Atlantic Coast & Part of Mediterranean Coast* (3 spp.)

- Pattern IVa1. F, C1 & C2, S3, M1A & 2B, & Cn 1.
 Pattern IVa2. F, C1, S3, & M1A.
 Pattern IVa3. F & C1.

b. *North & West Atlantic Coast & Pyrenees Mountains* (2 spp.)

- Pattern IVb1. F, M1A, & Cn 1, with or without M3.

c. *North & West Atlantic Coast Only* (18 spp.)

- Pattern IVc1. F, with or without M1B.
 Pattern IVc2. F & M2B.

V. *Pyrenees Mountains, With or Without Interior.* 54 spp.a. *Pyrenees Mountains, Castile, & Andalusia.*³ (3 spp.)

- Pattern Va1. M1A &/or Cn 1, Cn 2, Mer 2, M2B, & S2, with or without M3.
 Pattern Va2. M1A & 2B, Cn 2, Mer 2, & C1.

b. *Pyrenees Mountains, Castile, & Parts of Aragon.*³ (7 spp.)

- Pattern Vb1. M1A & 2B, Cn 2, & Mer 1, with or without M1B, M3, & S2.
 Pattern Vb2. M1A, Mer 1, & M1B & 2B.
 Pattern Vb3. M1A &/or Cn 1, M1B & 2B, & Cn 2.
 Pattern Vb4. M1A, 2A, & 2B, & Cn 2, with or without M3.

c. *Pyrenees Mountains & Aragon.*³ (7 spp.)

- Pattern Vc1. M1A &/or Cn 1 & Mer 1.

d. *Pyrenees & Other Northern Mountains.* (11 spp.)

- Pattern Vd1. M1A & 1B & 2B, with or without M2A.
 Pattern Vd2. M1A & 1B, with or without Cn 1.
 Pattern Vd3. M1A &/or Cn 1 & M2B.

e. *Pyrenees Mountains Only.* (26 spp.)

- Pattern Ve1. M1A &/or Cn 1.

VI. *Interior*. 42 spp.

- a. *Entire Interior (Castile, Andalusia, & Aragon)*.³ (3 spp.)
 Pattern VIa1. Cn 2, Mer 1 & 2, M2B, & S2, with or without M2A.
- b. *Castile & Andalusia*.³ (9 spp.)
 Pattern VIb1. Cn 2 & Mer 2, with or without M1B, 2B, 3, S1 & S2.
- c. *Andalusia Only*.³ (11 spp.)
 Pattern VIc1. Mer 2, with or without M2A, 2B, 3, & S2.
- d. *Castile & Penibaetic Range*.³ (3 spp.)
 Pattern VI d1. Cn 2 & M2B & 3.
- e. *Castile Only*.³ (11 spp.)
 Pattern VIe1. Cn 2, with or without M1B, 2B, & S2.
- f. *Aragon Only*. (4 spp.)
 Pattern VI f1. Mer 1, with or without S1.
- g. *Castile & Pyrenees Range*.³ (1 sp.)
 Pattern VIg1. Cn 2 & M1A.

VII. *Isolated Mountains and/or Steppe*. 27 spp.

- a. *Mountains*. (24 spp.)
 Pattern VIIa1. M1B.
 Pattern VIIa2. M2B.
 Pattern VIIa3. M3.
 Pattern VIIa4. M1B & 2B.
- b. *Mountains & Steppe*. (1 sp.)
 Pattern VIIb1. M2B & S3.
- c. *Steppe*. (2 spp.)
 Pattern VIIc1. S1.

VIII. *Ubiquitous*. 34 spp.

- Pattern VIIIa1. F, Cn 2, Mer 2, C1 &/or 2, 1 or more of the 3 mountain ranges, 1 or more of the 3 steppes, with or without Cn 1, & Mer 1.

Restriction to Biogeographic Regions

A scrutiny of the foregoing data discloses that most peninsular orthopteroids dwell within two or more of the six here-recognized biogeographic regions; *viz.*, mountain, steppe, central, meridional, north and

west Atlantic, and coastal. In many cases the species in question are ones of wide habitat occupancy, whose distributions sometimes extend to the point of ubiquity. (See Table III for a list of ubiquitous species). In other cases they are insects of more limited habitat selection whose wide range is more apparent than real; they merely take advantage of the development of their particular biotope in various neighboring regions. For example, some steppe orthopteroids live under steppe-like conditions in the coastal, meridional, and central regions, as well as in the regions here termed steppe; and many mountain-dwellers take advantage of the omnipresent mountains to live in one or more biogeographic regions other than the so-called mountain region.⁴

In contrast stand the truly restricted insects, many of which are localized endemics. They include species restricted, each, to a given biogeographic region. These insects, along with some others essentially restricted to the same region, are as follows:

MOUNTAIN REGION

Restricted to M1A (Pyrenees Range):

<i>Antaxius hispanicus</i>	<i>Isophya pyrenaea</i>
<i>Arcyptera kheili</i>	<i>Metaplastes pulchripennis</i>
<i>Arcyptera mariaae</i>	<i>Metrioptera saussureiana</i>
<i>Barbitistes serricauda</i>	<i>Miramella alpina</i>
<i>Chrysochraon dispar</i>	<i>Oedipoda germanica</i>
<i>Chorthippus intricatus</i>	<i>Omocestus antigai</i>
<i>Chorthippus montanus</i>	<i>Omocestus navasi</i>
<i>Cophopodisma pyrenaea</i>	<i>Polysarcus denticaudus</i>
<i>Dolichopoda bolivari</i>	<i>Polysarcus scutatus</i>
<i>Dolichopoda linderi</i>	<i>Paracaloptenus bolivari</i>
<i>Euthystira brachyptera</i>	<i>Sepiana sepium</i>
<i>Gomphoceridius brevipennis</i>	<i>Tettigonia cantans</i>

Almost Restricted to M1A:

<i>Arcyptera fusca</i> (also in Cn 1)	<i>Celes variabilis</i> (in Cn 1 only)
<i>Bicolorana bicolor</i> (in Cn 1 only)	<i>Podisma pedestris</i> (also in Cn 1)
<i>Callicrania obvia</i> (also in Cn 1)	

Restricted to M1B (Cantabrian & Vascocantabrian Ranges):

<i>Chorthippus cazurroi</i>	<i>Metrioptera burriana</i>
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Restricted to M2B (Central Range):

<i>Ameles paui</i>	<i>Omocestus uhagoni</i>
<i>Chorthippus ariasi</i>	<i>Stenobothrus stigmaticus</i>
<i>Ctenodecticus pupulus</i>	<i>Tettigonia hispanica</i>
<i>Eumigus ayresi</i>	

Restricted to M1A & 1B:

<i>Chorthippus apricarius</i>	<i>Psophus stridulus</i>
<i>Ephippiger vitum</i>	<i>Roeseliana roeselii</i>
<i>Euchorthippus declivus</i>	<i>Stenobothrus nigromaculatus</i>

Almost Restricted to M1A & 1B:

Mecostethus grossus (also in Cn 1)

Restricted to M1A & 2B:

Platypleis iberica

Restricted to M1B & 2B:

Podisma ignatii

Restricted to M1A, 1B, & 2B:

Gomphocerus sibericus

Restricted to M1A, 1B, 2A, & 2B:

Stenobothrus lineatus

Restricted to M3 (Penibaetic Range):

Baetica ustulata

Canariola emarginata

Chorhippus chloroticus

Ctenodecticus ramburi

Eumigus punctatus

Eumigus sulcatus

*Grylloides carrascoi*¹⁰

*Grylloides wwarovi*¹⁰

Heteracris annulosus

Omocestus bolivari

Omocestus burri

Omocestus femoralis

Phyllodromica baetica

Phyllodromica princisi

Phyllodromica sacarraoi

Pycnogaster inermis

Steropleurus politus

STEPPE REGION

Restricted to S1:

Ephippigerida asella

Ephippigerida marcei

Restricted to S3:

Acheta gossypii

Dericorys carthagonovae

Heteracris adspersus

Heterogamodes bifoveolata

NORTH & WEST ATLANTIC COASTAL REGION

Restricted:

Callicrania bolivari

Callicrania monticola

Callicrania selligera

Callicrania serrata

Conocephalus dorsalis

Epacromius tergestinus

Gryllomorpha merobricensis

Phaneroptera falcata

Phyllodromica moralesi

Pycnogaster cucullata

Almost Restricted:

Antaxius florezi (also in M1B)

Callicrania seoanei (also in M1B)

Oedipoda portugalensis (also in M2B)

Steropleurus asturiensis (also in M1B)

Steropleurus nobrei (also in M1B)

MEDITERRANEAN COASTAL REGION

Restricted to C1 (North Mediterranean Coast):

*Grylloides levantinus*¹⁰

Almost Restricted to C1:

Acheta hispanicus (also in S3)

Restricted to C2 (South Mediterranean & South Atlantic Coasts):

Acinipe expansa

Pycnogaster finoti

Acinipe hesperica

Scintharista notabilis

Decorana decorata

Sphingonotus lusitanicus

Discoptila fragosoi

Steropleurus pseudolus

Ephippigerida taeniata

Steropleurus squamiferus

Eurypryphes bolivari

Thalpomena algeriana

Leptopternis imitans

Thliptoblemmus barbarus

Phyllodromica trivittata

Thliptoblemmus caliendrun

Almost Restricted to C2:

Ameles picteti (also in M3)

Gryllomorpha longicauda (also in M3)

Ephippigerida hispanica (also in M3)

Gryllotalpa africana (also in S3)

Eurypryphes stali (also in M3)

Myrmecophila ochracea (also in S3)

Restricted to C1 & 2:

Conocephalus conocephalus

Mogoplistes squamiger

Almost Restricted to C1 & 2:

Heteracris littoralis (also in S3)

Tropidopola cylindrica (also in S3)

CENTRAL REGION

Restricted to Cn 2:

Ephippigerida longicauda

Steropleurus castellanus

Gampsocleis glabra

Steropleurus obsoletus

Platygygius platygygius

Steropleurus ortegai

Roeseliana oporina

MERIDIONAL REGION

Restricted to Mer 1 (Northeast of Peninsula):

Antaxius capellei

Yersinella raymondi

Steropleurus panteli

Almost Restricted to Mer 1:

Ephippigerida pantingana (also in S1)

Restricted to Mer 2 (South of Peninsula):

Acinipe paulinoi

Pterolepis cordubensis

Apteromantis aptera

Pycnomus graellsii

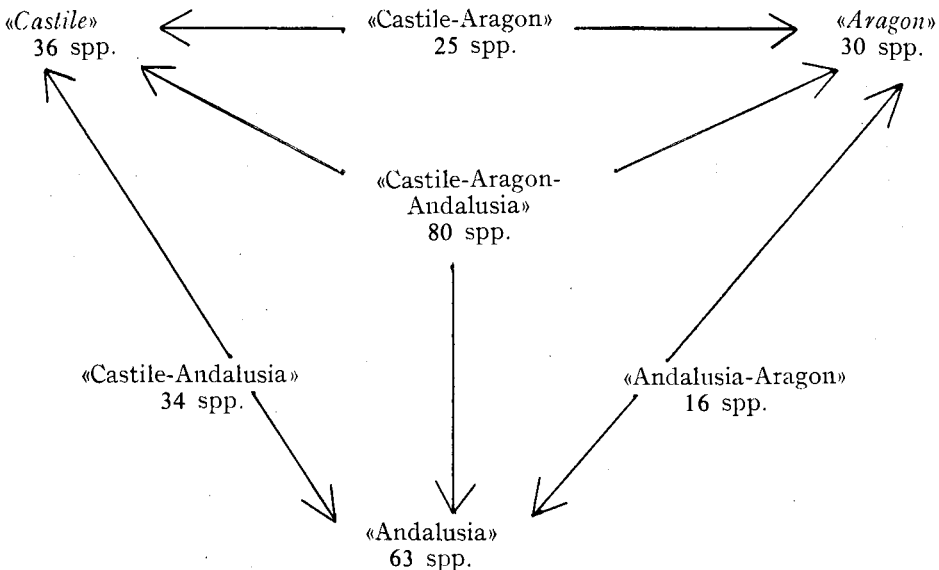
*Eugrylloides macropterus*¹⁰

Scirtobaenus lusitanicus

Restriction to Major Geographic Areas

Concern to this point has been focused on the occurrence of *Orthopteroidea* in natural biogeographic regions. However, many species are encountered in two or more such regions, and some occur throughout the Peninsula. This suggests that a grosser classification of the Peninsula is also in order. The distribution of the two barriers that are most important to peninsular orthopteroids (*viz.*, mountain and steppe) leads to a division of the Peninsula into three major geographic areas: a northern, central, and western «Castile» (composed mostly of F and Cn 2); a northern and eastern «Aragon» (mostly of Mer 1 and the Pyrenees Range); and an extensive southern «Andalusia» (mostly of Mer 2 and C2). «Aragon» is separated from the other two by Steppes 1, 2, and 3, and by the Iberic Mountains; and «Castile» and «Andalusia» from one another by the Central Mountains. These areas do not correspond to the regions of today bearing their respective names, but include roughly the Castile, Aragon, and Andalusia of antiquity.

With this gross classification of the Peninsula as a basis, it is now possible to plot the occurrence of the 284 species of Orthoptera and their allies for which we have sufficient locality data. The overall results are as follows:



«Castile», it is noted, has 36 species of *Orthopteroidea* restricted to it; «Aragon» 30; and «Andalusia» 63. Twenty-five species occur in both «Castile» and «Aragon» (or the entire north of the Peninsula); 34 species in both «Castile» and «Andalusia»; and 16 species in both «Andalusia» and «Aragon.» A total of 80 species occur in all three areas. The significance of these figures will be discussed later.

The above procedure carried out with respect to families tells less about the effectiveness of the land barriers than does the preceding, and furthermore is too generalized to disclose much about geographic distribution. However, attempted with respect to subfamilies, the procedure is informative, especially when the distributional data are based on a reasonable number of species per subfamily. The subfamilies below (represented by at least five species, each) have the following patterns of distribution:

BLATTOIDEA

Ectobiinae. Over half of the Iberian ectobiines are encountered in the North and West Atlantic Coastal Region (F), and the group tends toward a «Castilian-Andalusian» distribution.

TETTIGONOIDEA

Phaneropterinae. Many of the species are ubiquitous or semi-ubiquitous, though the group tends to be concentrated in «Aragon».

Decticinae. Most shield-backed katydids are widespread, and the group is rather uniformly distributed throughout the Peninsula.

Ephippigerinae. The species are comparatively restricted in range, each in its own part of the Peninsula. The group tends to be most strongly represented in «Castile.»

GRYLLOIDEA

Gryllinae. Many field crickets are ubiquitous or semi-ubiquitous, but the group is most strongly represented in «Andalusia.»

ACRIDOIDEA

Pamphaginae. The group is clearly «Andalusian» in distribution; only a few species extend into the north.

Tetrigidae. Most grouse locusts are widespread, and the group is rather uniformly distributed throughout the Peninsula.

Catantopinae (*sens. lat.*). Most spine-breasted grasshoppers are widespread, and the group tends to be uniformly distributed throughout the Peninsula (though weakest in «Castile»).

Oedipodinae. The band-winged grasshoppers are wide-ranging, most extending through much of the Peninsula; consequently the group is rather uniformly developed throughout.

Gomphocerinae. The slant-faced grasshoppers tend to be widespread, and the group is rather uniformly distributed throughout the Peninsula.

The following is the apparent distribution of certain subfamilies whose data are based on a more limited number of species, and therefore represent more questionable conclusions:

BLATTOIDEA

Blattinae. These domestic cockroaches are ubiquitous.

Polyphaginae. A single species is found in «Andalusia.»

MANTOIDEA

Amelinae. The amelines are most strongly developed in «Andalusia», but some extend into the north.

TETTIGONOIDEA

Pycnogastrinae. The group is probably most strongly developed in «Andalusia».

GRYLLACRIDOIDEA

Rhaphidophorinae. Two of these cave cricket species are found in caves of the Pyrenees Range, an «Aragonian» distribution.

GRYLLOIDEA

Trigonidiinae. One species occurs in «Andalusia».

Nemobiinae. The ground crickets are distributed rather uniformly throughout the Peninsula.

Myrmecophilinae. One species of ant cricket is known from «Andalusia».

The remaining subfamilies of Orthopteroidea have a reduced number of species, each, and show no clear-cut distributional patterns.

Endemism

The herein-given provisional list of Orthoptera and their allies of the Iberian Peninsula boasts 324 species, 116 of which are apparently indigenous to the area. This high (36%) endemism deserves further consideration. Its incidence in the various subfamilies of the order is of interest, and can be examined first in those groups in which the number of species (5 or more, each) is large enough to yield a meaningful percentage of endemism, as follows:

<i>Pamphaginae</i> & <i>Pycnogastrinae</i>	83 %	Endemism
<i>Ephippigerinae</i>	79 %	»
<i>Decticinae</i>	44 %	»
<i>Gryllinae</i>	41 %	»
<i>Ectobiinae</i>	38 %	»
<i>Amelinae</i>	29 %	»
<i>Gomphocerinae</i>	25 %	»
<i>Catantopinae</i> (<i>sens. lat.</i>).....	17 %	»
<i>Oedipodinae</i> & <i>Phaneropterinae</i>	13 %	»
<i>Mantinae</i> & <i>Tetrigidae</i>	0 %	»

The following are groups represented by a reduced number of species likely to yield a more biased incidence of endemism:

<i>Lonchodinae</i> & <i>Rhaphidophorinae</i>	50 %	Endemism
<i>Meconeminae</i>	33 %	»
<i>Tettigoniinae</i>	25 %	»
All other peninsular subfamilies not listed above.....	0 %	»

The data are also amenable to treatment to disclose the incidence of endemism within the various biogeographic regions of the Peninsula. The results follow:

MAJOR INTERIOR REGIONS

Isolated Regions Not in Contact With Coast

«Castile» less coast.....	10	endemic spp.
«Andalusia» less coast.....	9	» »
«Castile» & «Andalusia» less coast.....	8	» »
«Aragon» less coast.....	3	» »
«Castile» & Penibaetic Range, less coast....	2	» »
«Castile», «Andalusia», & «Aragon», less coast.	1	» »
Subtotal.....	33	endemic spp.

Interior Regions in Contact With Coast

Interior & Mediterranean Coast.....	13	endemic spp.
Interior & Mediterranean Coast at Pyrenees Mountains.....	5	» »
Interior & North & West Atlantic Coast....	4	» »
Interior & North & West Atlantic & Mediterranean Coasts.....	2	» »
Subtotal.....	24	endemic spp.
Interior Total.....	57	endemic spp.

ISOLATED MOUNTAIN RANGES

Penibaetic Mountains (M3).....	14	endemic spp.
Central Mountains (M2B).....	6	» »
Pyrenees Mountains (M1A).....	4	» »
Pyrenees & other northern mountains.....	2	» »
Cantabrian Mountains (M1B).....	2	» »
Central & Cantabrian Mountains.....	1	» »
Mountain Total.....	29	endemic spp.

COASTS (WITHOUT INTERIOR REGIONS)

North & West Atlantic Coast.....	11	endemic spp.
South Mediterranean & Atlantic Coasts.....	9	» »
North Mediterranean Coast.....	1	» »
Coast Total.....	21	endemic spp.

ISOLATED STEPPE

Steppe 1.....	2	endemic spp.
Steppe Total.....	2	» »
Grand Total for Peninsula.	109	endemic spp.

DISCUSSION

The biographic scheme here adopted (Fig. 2) seems essentially valid, though use during the study suggests the desirability of minor modification. The area termed Cen 1 proved to be merely an extension of the Pyrenees Range (M1A), and should be discarded. The mountain range adjacent to the levantine coast (M2A) was found to be a negligible factor in the distribution of orthopteroids, and should also be abandoned. Other possible improvements consist of subdividing C2 into an Atlantic and a Mediterranean segment and of subdividing F into a northern and a western segment at the Galician corner of the Peninsula. Neither subdivision was attempted, though final analysis of the data suggests the desirability of doing so.

The mountains constitute the barrier that is most important to the *Orthopteroidea* of the Peninsula. They present an obstacle that many lowland species cannot pass over, and at the same time offer the only suitable biotope for the montane species restricted to them; either way they are effective. Their action is complex, for they operate simultaneously as physical, climatic, biotic, and edaphic barriers.

The extensive mountain ranges of the Peninsula are mostly east-west in orientation, though their extremes often curve toward and meet adjacent, parallel ranges. The result is a rectangular or ovoid mountain pattern essentially east-west in distribution. Not surprisingly, the more restricted *Orthopteroidea* tend to have ranges that coincide with the mountains' east-west pattern. Such orthopteran distributions are dissimilar from those exhibited by the insects of, for example, the United States, where the major ranges are north-south in orientation.

As a whole, the mountains of the Iberian Peninsula have a high rate of endemism; their total of 29 autochthonous species outranks the number of endemic species characteristic of the coastal and steppe regions together, and compares not unfavorably with that of the remaining interior of the Peninsula. The various ranges differ little in the number of endemics they support, except for the Penibaetics (M3), which have more than do any other peninsular range. Indeed, the Penibaetic total of 14 indigenous species is greater than that of any other single region of the Peninsula.

The Pyrenees Mountains proved mediocre in their total of endemics, but are interesting in another respect; their orthopterous fauna includes a large number of widespread European or Palearctic species that exist in small, isolated populations on the Spanish side of the Peninsula, but do not extend farther south. Such «pocket» distribution is generally characteristic of species reaching the extremes of their range, which explanation seems to hold for these Pyrenees forms. Apparently many orthopteroids behave in accordance with the well-known remark «Europe ends at the Pyrenees.» However, many other orthopteroids that find their origin with the Palearctic fauna have a distribution that extends southward from the Pyrenees deep into the interior of the Peninsula.

The steppes of the Peninsula, whose development—a disclimax—is largely a consequence of man's activities, differ from the natural steppes of Siberia and Asia. Nevertheless, they provide effective barriers in limiting orthopteran dispersal. Together with the mountains they are responsible for the extremes of condition to which peninsular *Orthopteroidea* are exposed: on one hand, the mountain humidity, coolness, stony soil, wind,

and high elevation, and, on the other, the steppe aridity, heat, sandy and saline soil, and low elevation. The two together are the prime barriers causing the separation of «Aragon» from the two major areas to the west, «Castile» and «Andalusia.» Their effectiveness as barriers is illustrated by data given earlier (diagram, p. 31). Thirty-four species of *Orthopteroidea* occur in both «Castile» and «Andalusia», as opposed to only 16 found in both «Aragon» and «Andalusia». The explanation seems to lie in the barriers; between «Castile» and «Andalusia» is only mountain, but between «Aragon» and «Andalusia» are both mountain and steppe.

The comparatively low number of endemic steppe forms (a total of 2 spp.) comes as a surprise in view of the distinctiveness of the steppe environment, but it has an explanation. The areas termed S1, S2, and S3 are merely those places of their respective regions (Mer 1, Cen 2, and C2) with extreme development of aridity; thus, steppe-like conditions exist within the neighboring regions of each, some of whose endemics are probably steppe species, though this is not indicated by the data.

The interior fauna (*i. e.*, that of Cen 2 and Mer 1 & 2) has many endemic species (a total of 33), though in terms of area fewer than do the mountains. This comparatively high incidence of interior endemism is possibly explicable on the basis that most of the interior is really Meseta. The Meseta —lacking in neighboring North Africa and France— is land with the aspect of a prairie, but it is not really a prairie; it is tableland, a high plateau characterized by the elevation, climate, and other properties of low mountain ranges. Thus, it is an area that is half mountain and half prairie in nature, and is distinctly different from the areas impinging on it. Here —as wherever there is development of strong barriers— there is a tendency toward endemism. The fauna that occupies it is understandably rich, and many of the elements unique.

The origin of the interior species is various, sometimes general Palearctic, sometimes general Mediterranean, and sometimes North African Mediterranean, and does not always coincide with proximity; thus, some «Castilian» species find their origin with the distant North African fauna, and some «Andalusian» ones with the European fauna. On the average, however, most interior *Orthopteroidea* have their affinities with the approximate fauna; this is especially true of the «Andalusian» species, most of which are North African in origin.

The orthopteroids with a strictly North and West Atlantic Coast distribution (F) are exposed to distinctive environmental conditions, and have among them a comparatively large number of endemic forms (11 species); their affinities prove to be with the European fauna, as are those of most North and West Atlantic species that also extend into the interior of the Peninsula without reaching the Mediterranean Coast. However, those orthopteroids with a North and West Atlantic, as well as a South Atlantic and Mediterranean coastal distribution (with or without extending into the interior), are variable in their affinities.

The South Atlantic and Mediterranean forms (which are the remaining coastal species) are exposed to environmental conditions that vary little throughout the entire Mediterranean region from Spain to Asia Minor; hence, it is no surprise that they tend toward a Mediterranean origin.

The discrepancy that exists between the number of species with a «Castilian-Andalusian» and an «Aragonian-Andalusian» distribution (diagram, p. 31) has already been explained. There remains another apparent discrepancy; the number of species with a pure «Andalusian»

distribution is approximately twice that of those with either a «Castilian» or an «Aragonian» distribution (63 spp. in «Andalusia» vs. 36 in «Castile» and 30 in «Aragon»). The disparity cannot be explained by a greater number of endemics in the south than in the north; the total is about equal. It cannot be explained by a larger number of species of the rich North African fauna reaching the south of the Peninsula than of the poorer European or Palearctic fauna reaching the north; there are almost twice as many undoubted European species in the Peninsula as there are North African ones, and moreover it is obvious that the Straits of Gibraltar are infinitely more effective as a barrier than are the Pyrenees-rugged though the latter be. The apparent discrepancy could perhaps be explained by assuming that «Andalusia» is richer and more varied in development of biotopes, which does not seem likely. It is more likely that there is no discrepancy at all; the species with the «Castilian» and those with the «Aragonian» distribution (both northern) make a combined total of 66, as opposed to 63 with the «Andalusian» (southern) distribution, and the two northern regions together contribute to a combined land area about equal to that of «Andalusia».

Finally, let us inquire into a possible correlation between the structure and behavior and the degree of endemism characteristic of the various subfamilies. Are the endemics the sluggish, poorly flying or flightless forms with a reduced vagility that one might expect? In general, the answer is a positive one. Those Iberian groups with the highest percentage of endemism (*viz.*, the *Pamphaginae*, *Pycnogastrinae*, and *Ephippigerinae*) are composed of large, lubberly insects that clearly fit the above description. The remaining groups with a comparatively high degree of endemism include macropterous as well as brachypterous and apterous species, and it is the non-flying ones that prove to be endemic. In contrast, those groups composed mostly of strong, vigorous insects that fly well (*e. g.*, the *Phaneropterinae*, *Oedipodinae*, *Catantopinae*, *etc.*) are characterized by reduced endemism, and, as before, the endemic species among them are brachypterous or apterous. Sometimes (as in *Omocestus* spp. and certain other gomphocerines) the brachyptery is more pronounced in the female sex. However, in this event the reduction of vagility and consequent enhancement of endemism is the same, for oviposition by the females must be accomplished in areas they can reach; the extent to which the males move about is immaterial.

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SUMMARY

The Iberian Peninsula is biologically interesting because of its zonation, isolation, and strategic location. Its orthopterous fauna is rich, composed of several subfaunae whose biogeography is poorly understood.

The Peninsula is a shield-shaped land mass of about 225,000 square miles, of which one-third (the Meseta) is high central plateau, and much of the remainder is mountainous and dissected by several major river basins draining mostly arid land. Based on climate, soil, vegetation, and orthopteroid distributions, it is here subdivided into six biogeographic regions.

Much is known of the systematics of peninsular *Orthopteroidea*, and an important collection of these insects is available at the Instituto Español de Entomología, Madrid.

However, much information is needed, and of the species perhaps 15% —mostly localized endemics— are still undescribed. A list of recorded species is here assembled, based on the Instituto collections and recent literature. It includes 324 species within 141 genera and 38 subfamilies.

Comparison of the Iberian genera with those given in other faunal lists enables generalization on origin. Forty-four Iberian genera prove to be Mediterranean, 39 non-Mediterranean Palearctic, 21 cosmopolitan, 21 widespread throughout several realms though not cosmopolitan, 7 Ethiopian, 8 endemic, and 1 Atlantic.

The Instituto specimens and the literature provide distributional records that can be plotted against the peninsula's biogeographic regions to permit analysis of distribution. On that basis most species are found to dwell within two or more of the six biogeographic regions, and 34 species prove ubiquitous; in contrast, 132 species —some of them localized endemics— are restricted, each, to a single biogeographic region.

Inasmuch as many species occur in two or more biogeographic regions a grosser classification of the Peninsula is also indicated, based on the distribution of mountain and steppe, the two barriers that are most important to peninsular *Orthopteroidea*. This leads to recognition of three major geographic areas: northwestern «Castile», northeastern «Aragon», and southern «Andalusia».³ The disparity between the numbers of species that occur in both «Castile» and «Andalusia» (34 spp.) and those in both «Aragon» and «Andalusia» (16 spp.) is explicable; between the former is only mountain but between the latter both mountain and steppe.

The Iberian list includes 116 autochthonous species, a high level of endemism (36%) especially characteristic of the *Ephippigerinae*, *Pamphaginae*, and *Pycnogastrinae*.

Mountains constitute the barrier that is most important to peninsular *Orthopteroidea*, as many lowland species cannot surmount them, and 29 indigenous species find there the only suitable biotope. The various mountain ranges prove essentially east-west in orientation; hence, the east-west distribution of many restricted orthopteroids.

The non-montane interior fauna has a high number (33 spp.) of endemics, presumably because the interior is largely Meseta, a plateau with montane elevation, climate, and other attributes.

The origin of the Iberian orthopteroids does not always coincide with proximity; some «Castilian» species find their origin with the distant North African fauna, and some «Andalusian» ones with the European. Most, however, are related to the adjacent fauna.

RESUMEN

La Península Ibérica es interesante biológicamente por su división en zonas, su aislamiento y su peculiar situación. La biogeografía de su rica fauna ortopterológica, compuesta de varias subfaunas, no está aún suficientemente comprendida.

La península es una masa terrestre en forma de escudo, de unas 225.000 millas cuadradas, con una alta meseta central que ocupa un tercio de esa extensión; el resto, en su mayoría, es terreno montañoso dividido por varias cuencas de grandes ríos que recorren tierras generalmente áridas. Mediante el estudio de su clima, suelo y vegetación, así como de la distribución de los ortópteros de su fauna, la península puede subdividirse en seis regiones biogeográficas.

La sistemática de los *Orthopteroidea* ibéricos está bien conocida y el Instituto Español de Entomología posee una importante colección de este grupo.

Se presenta en este trabajo una lista de las especies conocidas, basada en las colecciones del Instituto y en las citas de bibliografía reciente. Totaliza ella 324 especies en 141 géneros y 38 subfamilias. Sin embargo, al ser necesaria una mayor información, se calcula que quizá exista un 15% de especies —la mayoría de ellas endemismos muy localizados— aún sin describir.

La comparación de los géneros ibéricos con los de otras listas faunísticas permite generalizar acerca de su origen. Cuarenta y cuatro géneros ibéricos son mediterráneos, 39 paleárticos no mediterráneos, 21 cosmopolitas, 21 ampliamente distribuidos en varias regiones aunque no cosmopolitas, 7 etiópicos, 8 endémicos y 1 atlántico.

Las colecciones del Instituto y el estudio de la bibliografía suministran citas de distribución que pueden correlacionarse con las regiones biogeográficas de la Península para analizar así su distribución. De acuerdo con ello se comprueba que la mayoría de las especies habita dos o más de las seis regiones biogeográficas y que 34 son ubicuas; por el contrario, 132 especies —algunas de ellas endemismos locales— pertenecen, cada una, a solamente una región biogeográfica.

Teniendo en cuenta precisamente la presencia de muchas especies en dos o más regiones biogeográficas se perfila un bosquejo de clasificación de la península, basado en la distribución de sus montañas y estepas, las dos barreras más importantes para los *Orthopteroidea* peninsulares. Ello conduce al reconocimiento de tres grandes áreas geográficas: «Castilla» al Noroeste,

«Aragón» al Nordeste, y «Andalucía» al Sur*. La diferencia entre el número de especies comunes a «Castilla» y «Andalucía» (34) y las comunes a «Aragón» y «Andalucía» (16) es explicable; las dos primeras sólo están separadas por montañas mientras que las dos últimas lo están por montañas y estepas.

La lista de especies ibéricas incluye 116 autóctonas, con un alto nivel de endemismo (36 %), especialmente característico de los *Ephippigerinae*, *Pamphaginae* y *Pycnogasirinae*.

Las cadenas montañosas constituyen la barrera más importante para los *Orthopteroidea* de la Península; muchas especies de llanura no pueden superarlas y 29 especies indígenas encuentran en la montaña el único biotopo aceptable para ellas. La mayoría de las cadenas montañosas tienen una orientación Este-Oeste, de ahí que la distribución Este-Oeste restrinja el área de muchos ortopteroideos.

La fauna interior no montana tiene un alto número de endemismos (33 especies), presumiblemente porque el interior es en su mayor parte una meseta de altitud, clima y otras características típicamente montanas.

No debe buscarse siempre el origen de los ortopteroideos ibéricos en la zona más cercana; algunas especies «castellanas» tienen su origen en la fauna norteafricana y otras «andaluzas» en Europa. La mayoría, sin embargo, están relacionadas con la fauna adyacente.

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*Las áreas geográficas denominadas aquí «Castilla», «Andalucía» y «Aragón» no corresponden a las regiones de hoy día, sino a áreas naturales conocidas en la antigüedad con estos nombres. «Castilla», que es nordoccidental, incluye F, M1B, Cn 2, S2 y parte de M2B; «Aragón», que es nordoriental, incluye M1A y 2A, Cn 1, Mer 1 y partes de S3; y «Andalucía», que es meridional, Mer 2, C2, M3, parte de M2B y la mayor parte de S3.

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TABLE I

Meteorological Data of Selected Localities, After HERNÁNDEZ-PACHECO (1955) and «Atlas Nacional de España» (1965).

City	Region	Altitude (in m.)	Av. Annual Rainfall (in mm.)	Av. Jan. Temp. (in °C.)	Av. Aug. Temp. (in °C.)	Total Av. Annual Hrs. of Sun
(COASTAL LOCALITIES)						
Santander	Cantabrian (northern) Coast	7	1191	9.9	19.7	1700
La Coruña	Northwest Coast	5	792	9.5	18.0	2000
Oporto (Portugal)	North Atlantic Coast	90	1271	8.5	19.4	— —
Faro (Portugal)	Southwestern Coast	10	444	11.5	23.1	2500
Málaga	Southern Coast (Costa del Sol)	9	509	12.3	25.4	3000
Valencia	Central Mediterranean Coast	13	416	10.0	24.6	2600
(INTERIOR LOCALITIES)						
Jaca	Pyrenees	810	877	2.5	19.1	2300
Valladolid	Northcentral	691	407	3.4	21.4	2600
Madrid	Central	655	420	4.8	23.5	2800
Cáceres	Westcentral	439	562	6.8	25.9	2700
Albacete	Eastcentral	685	336	4.6	24.4	2800
Sevilla	South	10	559	10.1	28.4	2800

TABLE II

Comparative Numbers of *Orthopteroidea* Encountered in North Africa, the Iberian Peninsula, and France, Based Primarily on CHOPARD (1943, 1951) and the Present Report.

Groups	N. African spp.	Iberian spp.	French spp.
<i>Ectobiinae</i>	29	14	12
<i>Pseudomopinae</i>	10	3	3
<i>Blattinae</i>	3	3	3
<i>Oxyhaloinae</i>	1	1	0
<i>Polyphaginae</i>	11	1	0
<i>Pycnoscelidinae</i>	0	1	0
BLATTOIDEA TOTAL	54 spp.	23 spp.	18 spp.
<i>Perlamantinae</i>	1	1	1
<i>Eremiaphilinae</i>	15	0	0
<i>Liturgusinae</i>	1	0	0
<i>Amelinae</i>	11	7	3
<i>Oxyothespinae</i>	6	0	0
<i>Mantinae</i>	7	5	3
<i>Vatinae</i>	1	0	0
<i>Empusinae</i>	4	1	1
MANTOIDEA TOTAL	46 spp.	14 spp.	8 spp.
<i>Bacillinae</i>	5	2	2
<i>Clitumninae</i>	2	2	1
PHASMOIDEA TOTAL	7 spp.	4 spp.	3 spp.

<i>Phaneropterinae</i>	16	14	14
<i>Meconeminae</i>	1	3	3
<i>Tettigoniinae</i>	7	4	2
<i>Conocephalinae</i>	2	4	3
<i>Copiphorinae</i>	1	1	1
<i>Decticinae</i>	25	37	34
<i>Ephippigerinae</i>	36	42	11
<i>Saginae</i>	0	1	1
<i>Pycnogastrinae</i>	1	6	0
<i>Hetrodinae</i>	8	0	0
<i>Stenopelmatinae</i>	1	0	0
TETTIGONOIDEA TOTAL	98 spp.	112 spp.	69 spp.
<i>Rhaphidophorinae</i>	0	2	6
GRYLLACRIDOIDEA TOTAL	0 spp.	2 spp.	6 spp.
<i>Gryllotalpinae</i>	2	2	1
<i>Nemobiinae</i>	5	4	3
<i>Gryllinae</i>	78	27	8
<i>Mogoplistinae</i>	5	3	3
<i>Myrmecophilinae</i>	3	1	2
<i>Trigonidiinae</i>	2	1	1
<i>Oecanthinae</i>	1	1	1
GRYLLOIDEA TOTAL	96 spp.	39 spp.	19 spp.
<i>Tridactylinae</i>	1	1	1
TRIDACTYLOIDEA TOTAL	1 sp.	1 sp.	1 sp.
<i>Tetrigidae</i>	5	8	9
TETRIGOIDEA TOTAL	5 spp.	8 spp.	9 spp.

TABLE II (Continuation)

Groups	N. African spp.	Iberian spp.	French spp.
<i>Truxalinae</i> sens. lat. (= <i>Acridinae</i> , <i>Truxalinae</i> sens. str., <i>Gomphocerinae</i> , & <i>Ere-</i> <i>mogryllinae</i>)	32 (1, 2, 24, & 5, resp.)	59 (1, 1, 57, & 0, resp.)	50 (1, 0, 49, & 0, resp.)
<i>Oedipodinae</i>	57	27	22
<i>Egnatiinae</i>	6	0	0
<i>Akicerinae</i>	5	1	3
<i>Pamphaginae</i> sens. lat. (= <i>Charilainae</i> & <i>Pamphagi-</i> <i>nae</i> sens. str.)	53 (1 & 52, resp.)	16 (0 & 16, resp.)	0 (0 & 0, resp.)
<i>Dericorythinae</i>	11	1	0
<i>Pyrgomorphinae</i>	15	1	1
<i>Catantopinae</i> sens. lat. (= <i>Cyrtacanthacridinae</i> , <i>Tropi-</i> <i>dopolinae</i> , <i>Calliptaminae</i> , <i>Ey-</i> <i>prepocnemidinae</i> , & <i>Catantopi-</i> <i>nae</i> sens. str.)	24 (3, 1, 9, 7, & 4, resp.)	16 (2, 1, 4, 4, & 5, resp.)	13 (1, 0, 5, 1, & 6, resp.)
ACRIDOIDEA TOTAL	203 spp.	121 spp.	89 spp.
TOTAL SPECIES	510 spp.	324 spp.	223 spp.

TABLE III

Annotated Provisional List of the Orthoptera and their Allies of the Iberian Peninsula.

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
ECTOBIIDAE			
ECTOBIINAE			
<i>Ectobius lucidus</i> (HAGB.)	No: F	IVb1, with M3	Mostly restricted to mountains of north & northwest; a delicate forest-dweller that hides during day under leaf litter, moss, & debris, & at night climbs over herbs & shrubs; see text
<i>E. pallidus</i> (OLIV.)	No: F	IVa1	
<i>E. panzeri</i> STEPH.	No: F	IIIb3	
<i>Phyllostroma baetica</i> (BOL.) ⁶	Yes	VIIa3	Peculiar to Sierra Nevada; see text
<i>P. carpetana</i> (BOL.)	Yes	IIIId5, with M1B & 2B	Under moss & dead plants
<i>P. chopardi</i> FERN. ⁶	Yes	Vc1, with M1A	
<i>P. moralesi</i> FERN. ⁶	Yes	IVc1	
<i>P. panteli</i> (BOL.) ⁶	No: NA	Ib6, with C2 & M3	
<i>P. princisi</i> FERN. ⁶	Yes	VIIa3	Scarce & localized in Sierra Nevada; see text
<i>P. sardea</i> SERV. ⁶	No		Balearic Islands
<i>P. subaptera</i> (RAMB.)	No: F	IIIb4, with M1A & 2B, C1, & S3	Male rarer than female & disappears early; under fallen leaves & vegetation; see text
<i>P. trivittata</i> (SERV.) ⁶	No: NA	IIb1	Under stones, fallen leaves, & debris
<i>P. virgulata</i> (BOL.) ⁶	?		Recorded only from Pedro do Cerro (Portugal)
<i>P. sacarraoi</i> FERN.	Yes	VIIa3	From Sierra de Cazorla

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
PSEUDOMOPINAE			
<i>Blattella germanica</i> (L.)	No: F & NA	Ubiqu. (VIIIa1)	Cosmopolitan
<i>Supella supellectilium</i> (SERV.) ⁶	No: F & NA		Cosmopolitan; heretofore adventive but now established in Madrid
<i>Loboptera decipiens</i> (GERM.)	No: F & NA	Ia1, with M1A, M2B, & S2	Almost ubiquitous; under weeds & stones
BLATTIDAE			
BLATTINAE			
<i>Blatta orientalis</i> L.	No: F & NA	Ubiqu. (VIIIa1)	Cosmopolitan
<i>Periplaneta americana</i> (L.)	No: F & NA	Ubiqu. (VIIIa1)	Cosmopolitan
<i>P. australasiae</i> (FAB.) ⁶	No: F		Cosmopolitan; presence in Peninsula probable but needs confirmation
OXYHALOINAE			
<i>Leucophaea maderae</i> (FAB.) ⁶	No: NA		Cosmopolitan; isolated records from various ports
POLYPHAGINAE			
<i>Heterogamodes bifoveolata</i> (BOL.) ⁶	No: NA	Iib2	Sandy situations; see text
PYCNOSCELIDINAE			
<i>Pycnoscelus surinamensis</i> (L.) ⁶	No		Cosmopolitan; isolated records from various ports

AMORPHOSCELIDAE

PERLAMANTINAE

Perlamantis alliberti GUER. No: F & NA Ic2, with S3 Crepuscular species

MANTIDAE

AMELINAE

Ameles abjecta (CYR.) No: F & NA Ia1, with M2B Almost ubiquitous; on tall herbs, shrubs, & low trees in hot, dry, uncultivated places, especially hillsides; its brachypterous females move by short «hops» & «runs» and its macropterous males by these methods & by flight; see text
On tall shrubs

A. assoi (BOL.) No: NA VIb1, with M2B & S2
A. decolor (CHARP.) No: F & NA Ia5, with M1A, 2B, & 3, & S2 On shrubs
A. pavi BOL.⁶ Yes VIIa2 Localized
A. picteti SAUSS. No: NA IIb1, with M3 On scrub in dry places
Apteromantis aptera (FUENTE) Yes VIc1 On low shrubs growing on dry, sunny hillsides; see text
Pseudoyersinia occidentalis BOL.⁶ No: NA See text

MANTINAE

Mantis religiosa L. No: F & NA Ubiqu. (VIIIa1) On low vegetation
Sphodromantis viridis (FORSK.)⁶ No: NA Ib6, with C2 & M3 On high shrubs; see text
Iris oratoria (L.) No: F & NA Ib3, with M2B & 3, S2 & 3 On shrubs
Rivetina baetica (RAMB.) No: NA Ia9 On shrubs in dry places
Geomantis larvoides PANT. No: F & NA Ic4, with Mer 1 & M2B Dry, stony places

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ⁷ & ⁹	Comments ⁸
EMPUSIDAE			
EMPUSINAE			
<i>Empusa pennata</i> (THUNB.)	No: F & NA	Ubiqu. (VIIIa1)	Crepuscular behavior
BACILLIDAE			
BACILLINAE			
<i>Bacillus rossii</i> (FAB.) ⁶	No: F & NA	IIIc4	Thamnophilous; rare; see text
<i>Clonopsis gallica</i> (CHARP.)	No: F & NA	IIIb4, with M3	Male is rare
LONCHODIDAE			
CLITUMNINAE			
<i>Leptynia hispanica</i> (BOL.)	No: F	Val, with M3	Practically endemic, though extends into south France, where males are uncommon, suggesting limits of range; in Guadarramas usually found on its food <i>Sarothamnus</i> , a legume shrub; see text
<i>Leptyniella attenuata</i> (PANT.)	Yes	IIIb2	On scrub in dry places
PHANEROPTERIDAE			
PHANEROPTERINAE			
<i>Phaneroptera falcata</i> (PODA) ⁶	No: F	IVc1	
<i>P. nana</i> FIEB.	No: F & NA	Ubiqu. (VIIIa1)	In vineyards, on shrubs & sometimes trees on hillsides

<i>Tylopsis lilifolia</i> (FAB.)	No: F & NA	IIIa2	On scrub in dry places; see text
<i>Odontura aspericauda</i> RAMB.	Yes	Ia4, with M2B	On mountainous sites exposed to sun; see text
<i>O. macphersoni</i> MOR.	Yes	VIe1, with M1B & 2B	A nocturnal, phytophilous inhabitant of uncultivated hillsides & mountainsides; in the Guadarramas usually found on <i>Sarothamnus</i> , a legume shrub that it eats almost exclusively; see text
<i>O. spinulicauda</i> RAMB.	No: NA	Ib6, with C2	«Andalusia»
<i>O. stenoxypa</i> (FIEB.) ⁶	No: NA		Balearic Islands; see text
<i>Leptophyes punctatissima</i> (BOSC.)	No: F	IIIId4, with Cn 1	Frequently in close association with ferns & nettle
<i>Isophya pyrenaea</i> (SERV.)	No: F	Ve1 (M1A only)	On meadows & patches of woodland in mountainous situations
<i>Barbitistes fischeri</i> (YERS.)	No: F	Va2	On high shrubs
<i>B. serricauda</i> (FAB.) ⁶	No: F	Ve1 (M1A only)	
<i>Metaplastes pulchripennis</i> (COSTA) ⁶	No: F	Ve1 (M1A only)	
<i>Polysarcus denticaudus</i> (CHARP.) ⁶	No: F	Ve1 (M1A only)	Common mountain form in south & central Europe
<i>P. scutatus</i> (BRUNN.) ⁶	No: F	Ve1 (M1A only)	
MECONEMIDAE			
MECONEMINAE			
<i>Meconema thalassinum</i> (DE G.)	No: F	IIIc3, with M1B	Arboreal, nocturnal inhabitant of well-wooded places, where it feeds on small insects; see text
<i>Cyrtaspis variopicta</i> COSTA ⁶	No: F & NA	IVa3	On shrubs & trees; adults last well into winter
<i>Canariola emarginata</i> NEWM. ⁶	Yes	VIIa3	Restricted to Sierra de Cazorla; see text

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ⁷ & ⁹	Comments ⁸
CONOCEPHALIDAE			
CONOCEPHALINAE			
<i>Conocephalus conocephalus</i> (L.)	No: F & NA	IIa1	Hygrophilous species often on reeds Recorded at least from Guadarrama Mountains
<i>C. discolor</i> (THUNB.)	No		
<i>C. dorsalis</i> (LATR.)	No: F	IVc1	On high herbs & reeds
<i>C. fuscus</i> (FAB.)	No: F & NA	IIc1	
COPIPHORINAE			
<i>Homorocoryphus nitidulus</i> (SCOP.)	No: F & NA	IIIa4; with Cn 1 & S3	Especially in humid places
SAGIDAE			
SAGINAE			
<i>Saga pedo</i> (PALL.)	No: F	VIa1	Females only — parthenogenetic?; strong predators largely on grasshoppers that frequent shrubs & other high vegetation generally in hot, open places; see text
TETTIGONIIDAE			
TETTIGONIINAE			
<i>Tettigonia cantans</i> (FUES.)	No: F	Ve1 (M1A only)	Among growths of ferns & nettle at fairly high elevations
<i>T. hispanica</i> (BOL.)	Yes	VIIa2	Found among nettles in Central Range; see text

<i>T. viridissima</i> L.	No: F & NA	Ubic. (VIIIa1)	Among tall vegetation in meadows & other mesic places
<i>Amphiestris baetica</i> (RAMB.)	No: NA	Ib6, with C2	On clumps of high vegetation in «Andalusia»
DECTICINAE			
<i>Antaxius capellei</i> CAZ. ⁶	Yes	VI f1	Montserrat & adjacent area (Catalonia)
<i>A. florezi</i> BOL.	Yes	IVc1, with M1B	On scrub
<i>A. hispanicus</i> BOL.	No: F	Ve1 (M1A only)	Almost endemic (found also in French Pyrenees)
<i>A. kraussi</i> BOL.	Yes	VI d1	On scrub
<i>A. pedestris</i> (FAB.) ⁶	No: F		Long recorded as probable from the Spanish Pyrenees
<i>A. spinibrachius</i> FISCH.	Yes	III d2, with M1B	Among low growths of thyme & rosemary on mountainsides
<i>Thyreonotus bidens</i> BOL.	Yes	VI b1, with M2B & 3	On low vegetation
<i>T. corsicus</i> (RAMB.)	No: F & NA	Ubic. (VIIIa1)	
<i>Pterolepis cordubensis</i> BOL. ⁶	Yes	VI c1	
<i>P. spoliata</i> RAMB. ⁶	Yes	Ib6, with C2, S3, & M3	Mountains of «Andalusia»
<i>Scirtobaenus grallatus</i> PANT. ⁶	Yes	Ib3, with S2	Low vegetation in dry places
<i>S. lusitanicus</i> BOL. ⁶	Yes	VI c1	
<i>Decticus albifrons</i> (FAB.)	No: F & NA	Ubic. (VIIIa1)	Among low, dry vegetation in hot places
<i>D. verrucivorus</i> (L.)	No: F	Vb1, with M1B	Elevated situations through much of north half of Peninsula; in fields, clearings, & scrub up into mountains; see text
<i>Gampsocleis glabra</i> (HERBST) ⁶	No: F	VI e1	Localized in mountains near Cuenca & Benabarre
<i>Yersinella raymondi</i> (YERS.) ⁶	No: F	VI f1	A few localities in Catalonia
<i>Ctenodecticus masferrerii</i> BOL. ⁶	Yes	Vc1, with M1A	One locality in Catalonia

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
<i>C. pupulus</i> BOL.	Yes	VIIa2	Taken at a few localities of Central Range
<i>C. ramburi</i> MOR.	Yes	VIIa3	On vegetation in dry mountainous or hilly places
<i>Pholidoptera griseoptera</i> (DEG.)	No: F	IIIId5, with M1B	Thamnophilous in north Spain
<i>Montana carpetana</i> (BOL.) ⁶	Yes	VIc1, with M2B & S2	Localized
<i>Platycleis affinis</i> FIEB.	No: F & NA	IIIId2, with M3 & S2	On dry vegetation in meadows
<i>P. denticulata</i> ZEUN.	No: F & NA	Ubiqu. (VIIIa1)	
<i>P. falx</i> (FAB.)	No: F & NA	Ib3, with S2 & 3	
<i>P. grisea</i> (FAB.) ⁶	No: F & NA		Widespread in meadows up into mountains; among grasses
<i>P. iberica</i> ZEUN. ⁶	Yes	Vd3, with M1A	
<i>P. intermedia</i> (SERV.)	No: F & NA	Ib1, with S3	Widespread in fields & woods
<i>P. sabulosa</i> AZAM	No: F & NA	IIIa1, with S2 & 3	Almost ubiquitous
<i>Sepiana sepium</i> (YERS.) ⁶	No: F	Ve1 (M1A only)	Catalonian Coast
<i>Tessellana tessellata</i> (CHARP.)	No: F & NA	IIIId1	All classes of terrain
<i>Decorana decorata</i> (FIEB.) ⁶	No: NA	IIb1	Extreme south of Spain & Portugal
<i>Metrioptera abbreviata</i> (SERV.) ⁶	No: F	IVc1	Pyrenees to San Sebastian
<i>M. burriana</i> UVAR.	Yes	VIIa1	Northern mountains from San Sebastian to Galicia
<i>M. saussureiana</i> (FR.-G.)	No: F	Ve1 (M1A only)	Pyrenees
<i>Bicolorana bicolor</i> (PHIL.) ⁶	No: F	Ve1, without M1A	Humid places?
<i>Roeseliana oporina</i> (BOL.) ⁶	Yes	VIe1	Near Saelices
<i>R. roeselii</i> (HAGB.)	No: F	Vd2	On woody plants in humid places

EPHIPPIGERIDAE

EPHIPPIGERINAE

<i>Uromenus rugosicollis</i> (SERV.) ⁶	No: F	Vc1, with M1A	Localized in provinces of Barcelona & Gerona; on low plants; see text
<i>Steropleurus andalusius</i> (RAMB.)	No: NA	Ib6, with C2, S3, & M3	On shrubs growing on dry hills
<i>S. asturiensis</i> BOL.	Yes	IVc1, with M1B	Mountainous places
<i>S. balearicus</i> (BOL.) ⁶	Yes		Mallorca Island
<i>S. brunneri</i> (BOL.)	Yes	VIb1, with M2B & S2	In clumps of spinous vegetation
<i>S. castellanus</i> BOL. ⁶	Yes	VIe1	Localized near Burgos; not collected this century
<i>S. catalaunicus</i> BOL.	Yes	Vc1, without M1A	Mountains in provinces of Lerida & Barcelona
<i>S. dilutus</i> (BOL.)	Yes	VIe1, with M2B & S2	On low plants in Central Mountain Range & foothills
<i>S. flavo-vittatus</i> BOL.	No: NA	Ib6, with C2, S3, & M3	
<i>S. martorelli</i> BOL.	Yes	Ib5	Coastal form in arid situations from Almeria to French border
<i>S. nobrei</i> BOL. ⁶	Yes	IVc1, with M1B	Mountainous places in northwest Peninsula
<i>S. obsoletus</i> BOL. ⁶	Yes	VIe1	Known only from El Molar (Madrid)
<i>S. ortegai</i> PANT.	Yes	VIe1	Localized in mountainous places near Cuenca
<i>S. panteli</i> (NAVAS) ⁶	Yes	VIIf1	Localized in mountainous places near Tarragona
<i>S. perezii</i> (BOL.)	Yes	Ic4, with Mer 1, Cn 1, M1A, 2A, & 2B	Comparatively widespread on high vegetation of uncultivated places in north Peninsula
<i>S. politus</i> BOL. ⁶	Yes	VIIa3	Localized in Sierras de Segura & La Sagra
<i>S. pseudolus</i> BOL. ⁶	Yes	IIf1	Huelva & Cordoba
<i>S. saussureianus</i> (BOL.) ⁶	Yes	IIId5	Localized in north Portugal & Leon & Burgos provinces, Spain

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
<i>S. squamiferus</i> BOL. ⁶	Yes	I Ib1	Known only from arid situations in Velez Rubio (Almeria)
<i>S. stali</i> BOL.	Yes	VIb1, with M2B	On shrubs, especially <i>Retama</i> & <i>Genista</i> , in lush mountainous places; see text
<i>Ephippigerida areolaria</i> (BOL.)	No: NA	Vb3, without M1A	On low vegetation in mountainous situations
<i>E. asella</i> NAVAS ⁶	Yes	VIIc1	A steppe form known only from El Miracle (Lerida)
<i>E. carinata</i> (BOL.)	Yes	Val	On high vegetation
<i>E. hispanica</i> (FIEB.)	Yes	I Ib1, with M3	Thamnophilous species in south of Peninsula
<i>E. longicauda</i> (BOL.) ⁶	Yes	VIe1	Known only from Ciudad Rodrigo & Salamanca
<i>E. marceti</i> (NAVAS) ⁶	Yes	VIIc1	Localized in steppes near Lerida
<i>E. pantingana</i> (NAVAS) ⁶	Yes	VI f1, with S1	Steppes of central Huesca Province
<i>E. paulinoi</i> (BOL.) ⁶	Yes	VIIa3	On <i>Genista</i> in Sierra Nevada
<i>E. taeniata</i> (SAUSS.)	No: NA	I Ib1	Known from Algeciras, from which it has spread to Morocco
<i>E. zapateri</i> (BOL.)	Yes	VI d1	On trees & shrubs, chiefly <i>Ilex</i> & <i>Retama</i> ; localized
<i>Ephippiger cunii</i> BOL.	No: F	Vc1, with M1A	Meadows of Catalonian mountains
<i>E. vitium</i> (SERV.)	No: F	Vd2	On shrubs, principally in mountainous areas
<i>Callicrania bolivari</i> (SEOANE)	Yes	IVc1	Hills & mountains of Galicia
<i>C. miegi</i> (BOL.)	Yes	VI b1, with M2B	On <i>Retama</i> & other high vegetation of mountainsides of Central Peninsula

<i>C. monticola</i> (SERV.) ⁶	No: F	IVc1	Northern coast from near Santander to the Pyrenees
<i>C. obvia</i> (NAVAS)	Yes	Ve1, with M1A	Foothills of Pyrenees
<i>C. selligera</i> (CHARP.) ⁶	Yes	IVc1	Mountains of north Portugal
<i>C. seoanei</i> (BOL.)	Yes	IVc1, with M1B	On shrubs in north of Portugal & Spain to near the Pyrenees
<i>C. serrata</i> (BOL.) ⁶	Yes	IVc1	Mountains in south Portugal
<i>Baetica ustulata</i> (RAMB.)	Yes	VIIa3	Monospecific genus indigenous to high peaks of Sierra Nevada; under stones on bare ground almost up to snow line; see text
<i>Platystolus martinezi</i> (BOL.)	Yes	Ib3, with M2B & S2	Especially among grasses & <i>Retama</i>
<i>P. surcularius</i> (BOL.)	Yes	VIb1	
PYCNOGASTRINAE			
<i>Pycnogaster cucullata</i> (CHARP.) ⁶	Yes	IVc1	On <i>Ilex</i> clumps in central Portugal
<i>P. finoti</i> BOL. ⁶	No: NA	IIb1	A form, each, from Algeciras & Cadiz provinces
<i>P. inermis</i> (RAMB.) ⁶	Yes	VIIa3	On Sierra Nevada mountainsides covered with vegetation
<i>P. jugicola</i> GRAELLS	Yes	VIb1, with M1B & 2B	On low vegetation or on the ground in mountainous places
<i>P. sanchez-gomezi</i> BOL.	Yes	Ia9, with M2A & 2B	In arid places
<i>Pycnomus graellsii</i> BOL.	Yes	VIc1	Endemic to Ciudad Real & Cuenca provinces; on spinous vegetation or on the ground; sometimes in cultivated fields
RHAPHIDOPHORIDAE			
RHAPHIDOPHORINAE			
<i>Dolichopoda bolivari</i> CHOP. ⁶	Yes	Ve1 (M1A only)	Caves of Catalonia only
<i>D. linderi</i> (DUF.) ⁶	No: F	Ve1 (M1A only)	Interior of dark, humid caves

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
TRIGONIDIIDAE			
TRIGONIDIINAE			
<i>Trigonidium cicindeloides</i> (RAMB.) ⁶	No: F & NA	Ia4	On moist hillsides & other lush places exposed to sun
OECANTHIDAE			
OECANTHINAE			
<i>Oecanthus pellucens</i> (SCOP.)	No: F & NA	Ubiqu. (VIIIa1)	On herbs & shrubs
GRYLLIDAE			
NEMOBIINAE			
<i>Nemobius sylvestris</i> (BOSC.)	No: F & NA	IIIc2, with M1B	In humid places beneath leaf litter, etc.
<i>Pteronemobius gracilis</i> (JAK.) ⁶	No: NA	Ib4	Hygrophilous species of uncommon occurrence; attracted to artificial light
<i>P. heydeni</i> (FISCH.) ⁶	No: F & NA	Ic1, with M1A	A localized, hygrophilous species
<i>P. lineolatus</i> (BRULLE)	No: F	IIIa4, with M2B	
GRYLLINAE			
<i>Sciobia lusitanica</i> (RAMB.)	No: NA?	Ubiqu. (VIIIa1)	Under stones in dry, uncultivated fields; diggers; see text
<i>Thliptoblemmus barbarus</i> (SAUSS.) ⁶	No: NA	IIb1	Males highly variable
<i>T. caliendrum</i> (FISCH.) ⁶	No: NA	IIb1	Cadiz & Chiclana; see text

<i>Gryllus bimaculatus</i> DE G.	No: F & NA	IIIa3	A tropical Afro-Asian species that in Iberia is a coastal form that never extends far into the interior
<i>G. campestris</i> L.	No: F & NA	Ubiqu. (VIIIa1)	Widespread; in cultivated fields, fallow land, clearings, & other hot, dry places with good exposure; see text
<i>Melanogryllus desertus</i> (PALL.)	No: F & NA	Ic1, with Cn 1, M2B, S1 & 2	Humid places under stones, on stream banks, and at borders of cultivated fields
<i>Acheta domesticus</i> (L.) ⁶	No: F & NA	Ubiqu. (VIIIa1)	Cosmopolitan
<i>A. gossypii</i> (COSTA) ⁶	No	IIB2	Garrucha (Almeria) & Cartagena
<i>A. hispanicus</i> (RAMB.) ⁶	No: NA	IIa2	
<i>Tartarogryllus burdigalensis</i> (LATR.)	No: F & NA	Ubiqu. (VIIIa1)	Near humid situations in prairie and cultivated and inundated land, often in own galleries though apparently does not dig; phytophilous at night & geophilous during day under stones, clumps of earth, fallen leaves, & debris
<i>Eugryllodes macropterus</i> (FUENTE) ⁶⁻¹⁰	No: NA	VIc1	Localized in Quero (Ciudad Real), where there is requisite humidity & salinity
<i>E. pipiens</i> (DUF.) ¹⁰	No: F	Ia6	Often under stones or in small holes on dry hills exposed to sun
<i>Gryllodes boscai</i> BOL. ⁶⁻¹⁰	Yes	Ic4, with M2A	
<i>G. carrascoi</i> BOL. ⁶⁻¹⁰	Yes	VIIa3	
<i>G. escalerae</i> BOL. ¹⁰	Yes	VIe1, with M2B	See text
<i>G. ibericus</i> BRUNN. ⁶⁻¹⁰	Yes	Vd3, without M1A	
<i>G. levantinus</i> BOL. ⁶⁻¹⁰	Yes	IIc1	
<i>G. littoreus</i> BOL. ¹⁰	Yes	VIc1, with M2B	Meadows near streams
<i>G. panteli</i> CAZ. ⁶⁻¹⁰	Yes	VIe1, with M2B	Ucles & nearby

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
<i>G. uvarovi</i> BOL. ^{6,10}	Yes	VIIa3	
<i>Gryllomorpha dalmatina</i> (OCSK.) ⁶	No: F & NA	Ia8, without S3	Under stones in humid places
<i>G. longicauda</i> (RAMB.) ⁶	No: NA	IIb1, with M3	
<i>G. merobricensis</i> FERN. ⁶	Yes	IVc1	
<i>G. uclensis</i> PANT.	No: F & NA	Ia3	
<i>Petaloptila aliena</i> (BRUNN.)	Yes	IIIc2	Under fallen leaves, moss, debris, & in houses
<i>P. bolivari</i> CAZ. ⁶	Yes	VIIb1	Localized; sometimes in caves
<i>Discoptila fragosoi</i> (BOL.) ⁶	No: NA	IIb1	
MOGOPLISTIDAE			
MOGOPLISTINAE			
<i>Mogoplistes brunneus</i> SERV. ⁶	No: F & NA	Ia2	Under debris & fallen leaves
<i>M. squamiger</i> (FISCH.) ⁶	No: F & NA	IIa1	A coastal form found under stones
<i>Arachnocephalus vestitus</i> COSTA ⁶	No: F & NA	Ia7	Under leaves
MYRMECOPHILIDAE			
MYRMECOPHILINAE			
<i>Myrmecophila ochracea</i> FISCH.	No: NA	IIb1, with S3	Under stones in ant galleries; a commensal form
GRYLLOTALPIDAE			
GRYLLOTALPINAE			
<i>Gryllotalpa africana</i> BEAUV. ⁶	No: NA	IIb1, with S3	Found only in «Andalusia»

<i>G. gryllotalpa</i> (L.)	No: F & NA	Ib3, with M1B & 2B & S3	Under stones in humid places (often its own galleries) or in cultivated fields
TRIDACTYLIDAE			
TRIDACTYLINAE			
<i>Tridactylus variegatus</i> (LATR.)	No: F & NA	Ubiq. (VIIIa1)	Sunny places on sandy banks of rivers
TETRIGIDAE			
TETRIGINAE			
<i>Paratettix meridionalis</i> (RAMB.)	No: F & NA	Ubiq. (VIIIa1)	Near banks of rivers, pools, & other swampy places
<i>Tetrix bipunctata</i> (L.) ⁶	No: F	IVa2	In wet places of northcentral Peninsula
<i>T. bolivari</i> SAUL. ⁶	No: F	VIc1, with M2B & 3	
<i>T. brachyptera</i> LUCAS ⁶	No: NA	Ib6, with C2	Banks of rivers, coasts, & humid meadows
<i>T. ceperoi</i> (BOL.)	No: F & NA	IIIa5, with M2B	Banks of rivers & wet meadows; almost ubiquitous
<i>T. depressa</i> BRIS.	No: F & NA	Vb1, with M3 & S2	Widespread near rivers, pools, & other swampy places
<i>T. subulata</i> (L.) ⁶	No: F & NA	IIIc3	Near rivers, pools, & other swampy places
<i>T. undulata</i> (SOW.) ⁶	No: F	IIIId1, with S3	Almost ubiquitous
PYRGOMORPHIDAE			
PYRGOMORPHINAE			
<i>Pyrgomorpha conica</i> (OLIV.)	No: F & NA	Ia2, with M3, S2 & 3	Widespread in dry places including uncultivated fields, meadows with high herbs, & hillsides & mountainsides with low shrubs

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
PAMPHAGIDAE			
AKICERINAE			
<i>Prionotropis flexuosa</i> (SERV.) ⁶	Yes	VIa1	Arid hillsides & other places exposed to sun
PAMPHAGINAE			
<i>Euryparaphes bolivari</i> (STAL)	Yes	IIb1	Localized in extreme south of Cadiz Province
<i>E. rugulosus</i> (STAL)	Yes	Ib6, with C2	Dry, hot places
<i>E. stali</i> (BORM.)	Yes	IIb1, with M3	Arid land
<i>Eumigus ayresi</i> BOL. ⁶	Yes	VIIa2	Recorded only from Sierra de la Estrella (Portugal); localized
<i>E. cucullatus</i> (BOL.)	Yes	Ib6, with S3 & M3; no C2	Warm, arid places
<i>E. monticola</i> (RAMB.)	Yes	VIc1, with M3	Sierra Nevada & Sierra de Alcaraz
<i>E. nugatorius</i> NAVAS ⁶	Yes	VIc1, with M2A	Low mountains of Maestrazgo region
<i>E. punctatus</i> (BOL.)	Yes	VIIa3	Localized; known only from two localities
<i>E. sulcatus</i> BOL. ⁶	Yes	VIIa3	Recorded only from Molinicos de la Sierra (Albacete); localized
<i>Acinipe deceptoria</i> (BOL.)	Yes	VIb1, with M2B & 3, & S1 & 2	On shrubs of steppe type in arid, low hillsides & other places
<i>A. expansa</i> (BRUNN.) ⁶	No: NA	IIb1	Recorded on the Peninsula from Algeciras only; localized
<i>A. hesperica</i> RAMB. ⁶	No: NA	IIb1	Uncultivated fields along southeastern coast; see text

<i>A. mabiliei</i> (BOL.)	Yes	Ic3	
<i>A. paulinoi</i> (BOL.) ⁶	Yes	VIc1	Portugal; localized
<i>Ocnerodes brunneri</i> (BOL.)	Yes	VIb1, with M2B & 3, S2	Uncultivated hillsides & other places characterized by steppe conditions
<i>O. fallaciosus</i> BOL.	Yes	Ib6, with C2 & M2B	Localized in mountainous places
ACRIDIDAE			
DERICORYTHINAE			
<i>Dericorys carthagonovae</i> BOL.	Yes	IIb2	Lives under desert or steppe conditions on hills & tableland exposed to sun
TROPIDOPOLINAE			
<i>Tropidopola cylindrica</i> (MARSCH.)	No: NA	IIa1, with S3	Humid, uncultivated places along Mediterranean Coast
CYRTACANTHACRIDINAE			
<i>Anacridium aegyptium</i> (L.)	No: F & NA	Ia2, with M3	Thamnophilous; widespread in towns as well as in country; adults last into winter
<i>Schistocerca gregaria</i> (FORSK.) ⁶	No: NA		From invasion from Africa, but apparently does not reproduce on Peninsula
CATANTOPINAE			
<i>Platyphyma giornae</i> (Rossi)	No: F & NA	Ubiq. (VIIIa1)	Moderately dry terrain of all types, especially hillsides & mountainsides; diurnally active & phytophilous on herbs, shrubs, & low vegetation; adults last into winter; see text

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
<i>Podisma ignatii</i> MOR.	Yes	VIIa4	Three localized subspecies in high meadows of Cantabrian & Central Mountains; see text
<i>P. pedestris</i> (L.)	No: F	Ve1, with M1A	High meadows of Pyrenees; see text
<i>Miramella alpina</i> (KOLL.) ⁶	No: F	Ve1 (M1A only)	Localized in alpine region of entire Pyrenees Range; see text
<i>Cophopodisma pyrenaea</i> (FISCH.)	No: F	Ve1 (M1A only)	Central & eastern Pyrenees above 1,500 meters
CALLIPTAMINAE			
<i>Calliptamus barbarus</i> (COSTA)	No: F & NA	Ubic. (VIIIa1)	All types of terrain Lacking only in north & northwest Mountain meadows from Navarre to the Mediterranean; see text
<i>C. italicus</i> (L.)	No: F & NA	Ubic. (VIIIa1)	
<i>C. wattenwylianus</i> PANT.	No: F & NA	Ib1, with M2B	
<i>Paracaloptenus bolivari</i> UV.	No: F	Ve1 (M1A only)	
EYPREPOCNEMIDINAE			
<i>Eyprepocnemis plorans</i> (CHARP.)	No: F & NA	Ia4	Sandy, sunny situations in Mediterranean areas of Peninsula
<i>Heteracris adspersus</i> (REDT.)	No: NA	IIb2	Hot places of steppe type
<i>H. annulosus</i> WALK. ⁶	No: NA	VIIa3	Sandy places along Mediterranean Coast
<i>H. littoralis</i> (RAMB.)	No: NA	IIa1, with S3	

OEDIPODINAE

<i>Psophus stridulus</i> (L.)	No: F	Vd2	Northern mountains of Peninsula Sunny, uncultivated land in «Andalusia»
<i>Scintharista notabilis</i> (WALK.) ⁶	No: NA	Iib1	
<i>Oedaleus decorus</i> (GERM.)	No: F & NA	Ubiqu. (VIIIa1)	Various places (especially meadows) extending from dry to humid Among high herbs in all types of situations, especially meadows
<i>Locusta migratoria</i> (L.)	No: F & NA	Ubiqu. (VIIIa1)	
<i>Celes variabilis</i> (PALL.) ⁶	No: F	Ve1, without M1A	Highly localized near Lérida & Huesca
<i>Thalpomena algeriana</i> (LUC.) ¹¹	No: NA	Iib1	Recorded on basis of a single male, collected at Algeciras
<i>Oedipoda charpentieri</i> (FIEB.)	No: F & NA	Ubiqu. (VIIIa1)	Arid situations
<i>O. coerulescens</i> (L.)	No: F & NA	Ubiqu. (VIIIa1)	Fields, hillsides, & mountains with good exposure
<i>O. fuscocincta</i> LUC.	No: F & NA	Ubiqu. (VIIIa1)	All types of places, especially un- cultivated fields & hillsides
<i>O. germanica</i> (LATR.) ⁶	No: F	Ve1 (M1A only)	Localized in dry places, woods, & fields of Catalonia
<i>O. miniata</i> (PALL.) ⁶	No: F & NA		Arid situations in Balearic Islands
<i>O. portugalensis</i> RAMME	Yes	IVc2	
<i>Sphingonotus azurescens</i> (RAMB.)	No: F & NA	Ubiqu. (VIIIa1)	Sandy, dry situations, especially hillsides exposed to sun
<i>S. coeruleans</i> (L.)	No: F & NA	Ia1, with M1A, M2B, & S2	
<i>S. lusitanicus</i> EBN. ⁶	Yes	Iib1	Arid, sandy, sunny situations, espe- cially fields & hillsides; almost ubi- quitous
<i>S. rubescens</i> (WALK.)	No: NA	Ib7	Restricted to sandy terrain of south- west angle of Peninsula
<i>Leptopternis imilans</i> (BRUNN.)	Yes	Iib1	Arid land in south; see text
<i>Acrotylus insubricus</i> (SCOP.)	No: F & NA	Ubiqu. (VIIIa1)	Adults last into winter

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
<i>A. patruelis</i> (H.-S.)	No: F & NA	Ia1, with S2	Arid, sunny places; nearly ubiquitous
<i>Aiolopus strepens</i> (LATR.)	No: F & NA	Ubiqu. (VIIIa1)	Meadows, hillsides, fields, etc.; adults last into winter
<i>A. thalassinus</i> (FAB.)	No: F & NA	Ubiqu. (VIIIa1)	Adults last into winter
<i>Platypygus platypygus</i> (PANT.) ⁶	No: NA	VIe1	Known only from Ucles (Cuenca) & Salamanca; dry terrain; strongly discontinuous distribution in other Mediterranean countries
<i>Epacromius tergestinus</i> (CHARP.) ⁶	No: F	IVc1	Recorded from San Vicente de la Barquera (Santander); localized
<i>Calephorus compressicornis</i> (LATR.)	No: F & NA	Ubiqu. (VIIIa1)	Dunes, meadows, & places near rivers & coasts
<i>Parapleurus alliaceus</i> (Germ.) ⁶	No: F	IVb1	Humid meadows & swampy places in the north
<i>Mecostethus grossus</i> (L.)	No: F	Vd2, with Cn 1	Localized in humid, swampy places
<i>Paracinema tricolor</i> (THUNB.)	No: F & NA	IIIa1, with M2B	Almost ubiquitous in meadows & mesic places, especially on reeds
TRUXALINAE			
<i>Truxalis nasuta</i> (L.)	No: F & NA	Ubiqu. (VIIIa1)	On both cultivated & uncultivated land, often sunny hillsides, but always in close association with grasses for food & perching; see text

ACRIDINAE

Acrida bicolor (THUNB.) No: NA Ia5, with S1 & Cn 1
Sunny terrain of all types, especially sandy hillsides; characteristic of Mediterranean areas of Peninsula

GOMPHOCERINAE

Brachycrotaphus tryxalicerus (FISCH.) No Ia8 Localized in the east; see text
Chrysochraon dispar (GERM.) No: F Ve1 (M1A only) Presently known from western Pyrenees
Euthystira brachyptera (OCSK.) No: F Ve1 (M1A only) Localized in high meadows of Pyrenees
Ochrilidia tibialis (FIEB.)⁶ No Of doubtful occurrence along Mediterranean Coast
Stauroderus scalaris (FISCH.-WALD.) No: F Vb3, with M1A Mountainous places
Chorthippus albomarginatus (DEG.) No: F IVc1, with M1B Said to be widespread (contrary to data here); humid places
C. apicalis (H.-S.) No: F & NA Ib3, with M2B & 3 & S2 Meadows, fields, etc.
C. apricarius (L.) No: F Vd2 Meadows of northern mountains
C. ariasi BOL.⁶ Yes VIIa2 Known only from Sierra de Gredos
C. biguttulus (L.) No: F & NA Widespread on various terrains
C. binotatus (CHARP.) No: F & NA IIIb1, with M2A On various terrains, usually with some elevation; almost ubiquitous
C. brunneus (THUNB.) No: F & NA Widespread in meadows; recorded at least from M2B & 3, Cn 2, & C2, and certain to be elsewhere
C. cazurroi BOL.⁶ Yes VIIa1 Known only from Picos de Europa
C. chloroticus BOL.⁶ Yes VIIa3 Recorded from arid places in Santiago de la Espada (Jaen)
C. dorsatus (ZETT.) No: F & NA III d3 Damp situations

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
<i>C. intricatus</i> NAVAS ⁶	Yes	Ve1 (M1A only)	Known only from the type, taken at Canfranc (Huesca)
<i>C. jucundus</i> (FISCH.)	No: F & NA	Ubiqu. (VIIIa1)	Meadows & wet places
<i>C. longicornis</i> (LATR.)	No: F	IIIb1, with Cn 1 & Mer 1	Virtually ubiquitous in swampy situations & meadows
<i>C. montanus</i> (CHARP.) ⁶	No: F	Ve1 (M1A only)	Recorded at least from Pyrenees near French border
<i>C. saulcyi</i> (KRAUSS)	No: F	Vc1, with M1A	Subspecies practically endemic; restricted to Pyrenees
<i>C. vagans</i> (EVERSM.)	No: F		Widespread in meadows; recorded at least from M2B & 3, Cn 2, & C2, and certain to be elsewhere
<i>Euchorhippus angustulus</i> RAMME ⁶	Yes		Balearic Islands
<i>E. declivus</i> (BRIS.) ⁶	No: F	Vd2	
<i>E. pulvinatus</i> (F.-W.)	No: F & NA	Ubiqu. (VIIIa1)	A wide variety of somewhat humid places from sea level to high peaks
<i>Stenobothrus boliviari</i> (BRUNN.)	Yes	Ic2, with M2A & 3	Especially meadows of mountains
<i>S. festivus</i> BOL.	No: F	VIa1, with M2A	Mesetas of little elevation to meadows of high mountains
<i>S. fischeri</i> (EVERSM.)	No: F		Dry, hot places in northcentral of Peninsula
<i>S. grammicus</i> CAZ.	No: F	Vb4, with M3	Mountainous places
<i>S. lineatus</i> (PANZ.)	No: F	Vd1, with M2A	Meadows of mountains
<i>S. nigromaculatus</i> (H.-S.)	No: F	Vd2	
<i>S. stigmaticus</i> (RAMB.)	No: F	VIIa2	Mountainous places
<i>Omocestus antigai</i> BOL.	Yes	Ve1 (M1A only)	Localized in mountains of Catalonia; see text

<i>O. bolivari</i> CHOP.	Yes	VIIa3	Known only from high meadows of Sierra Nevada; see text
<i>O. burri</i> UV. ⁶	Yes	VIIa3	Known from a single male caught in Moratalla (Murcia); see text
<i>O. femoralis</i> BOL. ⁶	Yes	VIIa3	Recorded only from arid places in Sierra de Cazorla; see text
<i>O. haemorrhoidalis</i> (CHARP.) ⁶	No: F		In somewhat humid places of middle west of Peninsula
<i>O. minutissimus</i> (BOL.)	Yes	Vb4	Between low plants growing on elevated mountainsides; see text
<i>O. navasi</i> BOL.	Yes	Ve1 (M1A only)	Found only in Sierra de Guara (Huesca); see text
<i>O. panteli</i> (BOL.)	Yes	Ubiqu. (VIIIa1)	Meadows of mountain valleys
<i>O. petraeus</i> (BRIS.) ⁶	No: F		Formerly uncertain from the Peninsula but now recorded from Cn 2
<i>O. raymondi</i> (YERS.)	No: F & NA		Widespread in all classes of terrain, mountain, steppe, & coastal
<i>O. uhagoni</i> (BOL.)	Yes	VIIa2	Restricted to and localized in high elevations of Central Range; see text
<i>O. ventralis</i> (ZETT.) ⁶	No: F & NA	Vb2	Arid places in northwest & central of Peninsula
<i>O. viridulus</i> (L.)	No: F	Vb2	Mountain meadows in middle north & probably also south of Peninsula
<i>Myrmeleotettix maculatus</i> (THUNB.)	No: F & NA	IIIId4	A mountain form
<i>Gomphoceridius brevipennis</i> (BRIS.)	No: F	Ve1 (M1A only)	High meadows of Catalan Pyrenees
<i>Gomphocerus sibiricus</i> (L.)	No: F	Vd1	A subspecies in meadows near the peaks of the Guadarrama & Cantabric Ranges & another in those of the Aragonian & Catalan Pyrenees
<i>Doclostaurus crassiusculus</i> (PANT.)	No	VIe1, with S2	Steppe form
<i>D. crucigerus</i> (RAMB.)	No		Widespread

TABLE III (Continuation)

Groups & Species	Iberian Endemism ⁵	Iberian Distribution ^{7 & 9}	Comments ⁸
<i>D. genei</i> (OCSK.)	No: F & NA	Ib2	Widespread, especially in dry, sunny places along coasts
<i>D. maroccanus</i> (THUNB.)	No: F & NA	Ib3, with M2B & S2	A widespread, destructive locust; see text
<i>Arcyptera fusca</i> (PALL.)	No: F	Ve1, with M1A	Shrub regions of Aragonian & Catalan Pyrenees
<i>A. kheili</i> AZAM	No: F	Ve1 (M1A only)	Known only from mountain meadows of Jaca (Huesca)
<i>A. mariae</i> NAVAS ⁶	Yes	Ve1 (M1A only)	Recorded on basis of one male, collected at El Run (Huesca), in mountainous country
<i>A. microptera</i> (F.-W.)	No: F	VIId1	Mountainous areas
<i>A. tornosi</i> BOL.	Yes	IIId2	Elevated meadows of mountainous areas
<i>Ramburiella hispanica</i> (RAMB.)	No: F & NA	Ia2, with M2B & 3, S2 & 3	Widespread between shrubs in warm places of steppe type

TABLE IV

Iberian Genera Classified According to World Distribution and Habitat.*

Distribution	Genera	Principal Habitat**									
		1	2	3	4	5	6	7	8	9	10
PALEARCTIC											
General	<i>Arcyptera</i>	x				x					
Less NA	<i>Barbitistes</i>	x		x							
Less NA	<i>Bicolorana</i>					x					
General	<i>Calliptamus</i>	x				x					
Less NA	<i>Celes</i>	x				x					
Less NA	<i>Chrysochraon</i>					x					
Boreo-alpine less NA & Asia	<i>Cophopodisma</i>	x									
General	<i>Dedecus</i>					x					
Less non-Iberian Europe	<i>Dericorys</i>						x				
Less NA	<i>Epacromius</i>					x					
General	<i>Euchorthippus</i>					x					
Boreo-alpine less NA	<i>Euthystira</i>	x?			x						
Less NA	<i>Gampsocleis</i>					x					
Boreo-alpine less NA & Asia	<i>Gomphoceridius</i>	x				x					
Boreo-alpine less NA	<i>Gomphoceris</i>	x				x					
Less non-Iberian Europe	<i>Heterogamodes</i>						x		x		
Less NA	<i>Isophya</i>	x				x					
Less NA	<i>Leptophyes</i>			x							
Less non-Iberian Europe	<i>Leptopternis</i>						x				
Less NA	<i>Meconema</i>		x								
General	<i>Metrioptera</i>	x			x						
Boreo-alpine less NA	<i>Miramella</i>	x									
Less NA	<i>Montana</i>										x
General	<i>Myrmeleotettix</i>	x				x					
General	<i>Ochridia</i>										x
General	<i>Oedipoda</i>					x	x				
General	<i>Omocestus</i>	x?		x		x					
Less NA	<i>Parapleurus</i>				x						
Less NA	<i>Pholidoptera</i>			x							
General	<i>Platycleis</i>	x		x		x					
Boreo-alpine less NA	<i>Podisma</i>	x				x					
Less NA	<i>Psophus</i>	x	x								
General	<i>Ramburiella</i>										x
General	<i>Rivetina</i>			x							
Less NA	<i>Roeseliana</i>				x	x					
Less NA	<i>Stauroderus</i>	x									
General	<i>Stenobothrus</i>	x				x					
Less Asia	<i>Tessellana</i>					x					
General	<i>Tettigonia</i>	x		x							
(Total Palearctic less pure Mediterranean & Atlantic = 39)											
ATLANTIC SUBDIVISION OF PALEARCTIC											
Atlantic subdivision of Palearctic											
(Total Atlantic = 1)		x									

* This compilation gleaned from standard literature is incomplete, tentative, and here and there open to question; it is merely a preliminary working list prepared for purposes of this report.

** Code: 1. Montane or semimontane; 2. Woodland; 3. Scrub, shrub, or woodland ecotonal; 4. Lush herbage or swamp; 5. Grassland, prairie, steppe, or savanna; 6. Desert, dunes, rock, or bare ground; 7. Protective leaf litter, stones, or debris; 8. Caverns, burrows, or fossorial; 9. Domestic or partly domestic; 10. Variable or uncertain.

TABLE IV (Continuation)

Distribution	Genera	Principal Habitat**									
		1	2	3	4	5	6	7	8	9	10
MEDITERRANEAN SUBDIVISION OF PALEARCTIC											
Less non-Iberian Europe	<i>Acinipe</i>			x							
General	<i>Ameles</i>			x				x			
Less non-Iberian Europe	<i>Amphiestris</i>			x							
General	<i>Antaxius</i>	x		x							
Western part less non-Iberian Europe	<i>Apteromantis</i>			x							
General	<i>Bacillus</i>			x							
General	<i>Calephorus</i>					x	x				
General	<i>Clonopsis</i>			x							
Western part	<i>Cyrtaspis</i>		x								
Western part less non-Iberian Europe	<i>Decorana</i>										x
General	<i>Discoptila</i>										x
General	<i>Doclostaurus</i>					x					
Less NA	<i>Dolichopoda</i>								x		
General	<i>Ephippiger</i>	x		x						x	
Less non-Iberian Europe	<i>Ephippigerida</i>			x		x					
Less non-Iberian Europe	<i>Eumigus</i>	x					x				
Less non-Iberian Europe	<i>Euryparaphes</i>										x
General	<i>Geomantis</i>							x			
Western part	<i>Grylloides</i> ¹⁰									x	x
General	<i>Gryllomorpha</i>							x			
General	<i>Iris</i>			x							
Less NA	<i>Metaplastes</i>			x							
General	<i>Mogoplistes</i>		x					x			
Less non-Iberian Europe	<i>Ocneroles</i>										x
Less non-Iberian Europe	<i>Odontura</i>			x							
Less NA	<i>Paracaloptenus</i>	x				x					
General	<i>Perlamantis</i>										x
General	<i>Phyllodromica</i>							x			
General	<i>Platyphyma</i>										x
Less NA	<i>Platyphymus</i>										x
Less NA	<i>Polysarcus</i>	x				x					
Less NA	<i>Prionotropis</i>										x
Western part less non-Iberian Europe	<i>Pseudoyersinia</i>										x
Less non-Iberian Europe	<i>Pterolepis</i>										x
Western part less non-Iberian Europe	<i>Pycnogaster</i>										x
Less NA	<i>Saga</i>			x							
Western part less non-Iberian Europe	<i>Sciobia</i>								x		
Less NA	<i>Sepiana</i>			x	x						
Less non-Iberian Europe	<i>Steropleurus</i>	x		x							
Less non-Iberian Europe	<i>Thalpomena</i>	x		x			x				
Less non-Iberian Europe	<i>Thliptoblemmus</i>								x		
Western part	<i>Thyreonotus</i>			x							
General	<i>Uromenus</i>			x							
Less NA	<i>Yersinella</i>			x							

(Total Mediterranean = 44)

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TABLE IV (Continuation)

Distribution	Genera	Principal Habitat**									
		1	2	3	4	5	6	7	8	9	10
PALEARCTIC OR MEDITERRANEAN & ETHIOPIAN, ONE OR MORE PARTS OF EACH											
General	<i>Acrotylus</i>					x	x				
Especially tropical & subtropical parts	<i>Aiolopus</i>					x					
General	<i>Ectobius</i>		x	x		x	x	x			
General	<i>Empusa</i>			x		x					
General	<i>Heteracris</i>						x				
General	<i>Phaneroptera</i>			x		x					
(Total Palearctic & Ethiopian = 6)											
ETHIOPIAN, ONE OR MORE PARTS											
General	<i>Brachycrotaphus</i>					x					
General	<i>Leptynia</i>			x							
Especially tropical parts	<i>Mantis</i>			x		x					
General	<i>Paracinema</i>				x	x					
Especially tropical parts	<i>Sphodomantis</i>						x				x
Tropical & subtropical	<i>Truxalis</i>										
General	<i>Tylopsis</i>			x							
(Total Ethiopian = 7)											
NEARCTIC & PALEARCTIC, ONE OR MORE PARTS OF EACH											
Parts of each	<i>Chorthippus</i>	x			x	x	x				
Parts of each	<i>Mecostethus</i>				x						
(Total Holarctic = 2)											
PRINCIPALLY PALEARCTIC, ETHIOPIAN, ORIENTAL, & AUSTRALIAN, VARIOUS COMBINATIONS											
General	<i>Acrida</i>				x	x					
General	<i>Anacridium</i>			x							
General	<i>Engrylloides</i> ¹⁰	x					x				
Especially tropical & subtropical parts	<i>Eyprepocnemis</i>						x				
General	<i>Locusta</i>										x
General	<i>Melanogryllus</i>							x			
General	<i>Oedaleus</i>					x					
General	<i>Pteronemobius</i>				x						
General	<i>Pyrgomorpha</i>										x
General	<i>Scintharista</i>						x				
General	<i>Sphingonotus</i>						x				
General	<i>Tartarogryllus</i>							x			
General	<i>Tropidopola</i>					x					
(Total Palearctic, Ethiopian, Oriental, & Australian = 13)											
COSMOPOLITAN OR OTHERWISE GLOBALLY WIDESPREAD											
General	<i>Acheta</i>									x	
Tropicopolitan	<i>Arachnocephalus</i>										x
General	<i>Blatta</i>									x	
General	<i>Blattella</i>									x	
General	<i>Conocephalus</i>				x						

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TABLE IV (Continuation)

Distribution	Genera	Principal Habitat**									
		1	2	3	4	5	6	7	8	9	10
COSMOPOLITAN, CONT.											
General	<i>Gryllotalpa</i>				x				x		
General	<i>Gryllus</i>					x		x			
Tropicopolitan	<i>Homorocoryphus</i>				x						
General	<i>Leucophaea</i>									x	
General	<i>Loboptera</i>							x			
General	<i>Myrmecophila</i>								x		
General	<i>Nemobius</i>		x					x			
General	<i>Oecanthus</i>			x							
Tropicopolitan	<i>Paratettix</i>				x						
General	<i>Periplaneta</i>									x	
General	<i>Pycnoscelus</i>									x	
General	<i>Schistocerca</i>			x			x				x
Tropicopolitan	<i>Supella</i>									x	
General	<i>Tetrix</i>			x	x						
General	<i>Tridactylus</i>				x				x		
Tropicopolitan	<i>Trigonidium</i>				x						
(Total cosmopolitan = 21)											
ENDEMIC OR ESSENTIALLY SO											
Endemic or essentially so	<i>Baetica</i>	x									
Endemic or essentially so	<i>Callicrania</i>	x		x							
Endemic or essentially so	<i>Ctenodecticus</i>										x
Endemic or essentially so	<i>Leptyniella</i>			x							
Endemic or essentially so	<i>Petaloptila</i>							x		x	
Endemic or essentially so	<i>Platystolus</i>										x
Endemic or essentially so	<i>Pycnomus</i>										x
Endemic or essentially so	<i>Scirtoabaenus</i>										x
(Total endemics = 8)											

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FOOTNOTES

¹ This project was one phase of an overall investigation undertaken at the Instituto Español de Entomología, Madrid, Spain, during the tenure of Research Grant GB-4796 awarded to the Senior Author in 1966-1967 by the National Science Foundation of the United States of America.

² North Africa as far south as the Sahara Desert; based on Chopard (1943).

³ The geographic areas here termed «Castile», «Andalusia», and «Aragon» do not correspond to the regions of today, but to natural areas known in antiquity under those names. «Castile», which is northern and western, includes F, M1B, Cn 2, S2, and part of M2B; «Aragon», which is northern and eastern, M1A & 2A, Cn 1, C1, Mer 1, and parts of S3; and «Andalusia», which is southern, Mer 2, C2, M3, part of M2B, and most of S3.

⁴ The regions termed *mountain* on Fig. 2 (M1A, M1B, M2A, M2B, and M3) represent only those that are highest.

⁵ Endemism based largely on absence from the two immediately adjoining faunae, France and North Africa. If *yes*, the species is apparently endemic; if *no*, it is not, and the adjacent area that shares it (France, North Africa, or both) is indicated by the abbreviation used. *No* without an abbreviation shows that the species occurs somewhere else in the world (though not in France or North Africa).

⁶ Species whose distribution, as shown here, may be unrepresentative, being based on an insufficient sample (less than 25 specimens).

⁷ The explanation of the following is found on pp. 24-27, *Synopsis of Iberian Orthopteroid Distributions*. Included are certain minimal distributional patterns, often with qualifying notations. All unqualified distributions (*i. e.*, those lacking the words *with* or *without*, together with a qualifying region or regions) are to be regarded as minimal for that particular pattern.

⁸ Based on personal experience and standard works, especially Bolívar (1898), Cazorro (1888), and Morales (1942, 1945, 1947).

⁹ Abbreviations used below refer to biogeographic regions explained in Fig. 2.

¹⁰ Once this report was in press, the authors received an issue of the Arquivos do Museu Bocage, Lisboa, containing J. DE A. FERNANDES' article «Les Gryllides de la Faune Iberique, I: Les genres *Gryllodinus* Bol. et *Eugrylloides* Chop.», Ser. 2, 1: 351-390, 1967, in which the said genera were reduced to four species: *Gryllodinus kerkennensis* (Finot) (= *Eugrylloides macrop-terus* (Fuente)), *Eugrylloides pipiens* (Duf.), *E. littoreus* (Bol.), and *E. escalerae* (Bol.). Inasmuch as the authors have had insufficient opportunity to evaluate this important revision, it is inappropriate to incorporate the above changes into the manuscript at this time.

¹¹ The same as for footnote n^o. 10, once this report was in press, the authors received an issue of the Arquivos do Museu Bocage, Lisboa, containing J. de A. FERNANDES' article "A new subspecies of *Mioscirtus wagneri* Evers.", Ser. 2, 11: 1-4, 1968, in which this species (and also the genus) is recorded as new for the peninsula. This taxon, which extends from Asia Minor through all the Mediterranean African coast to the southwest of the Iberian Peninsula, must follow *Thalpomena algeriana* (Luc.) in Table III, with the following distribution and comments: No: NA; I1b1; sandy places.

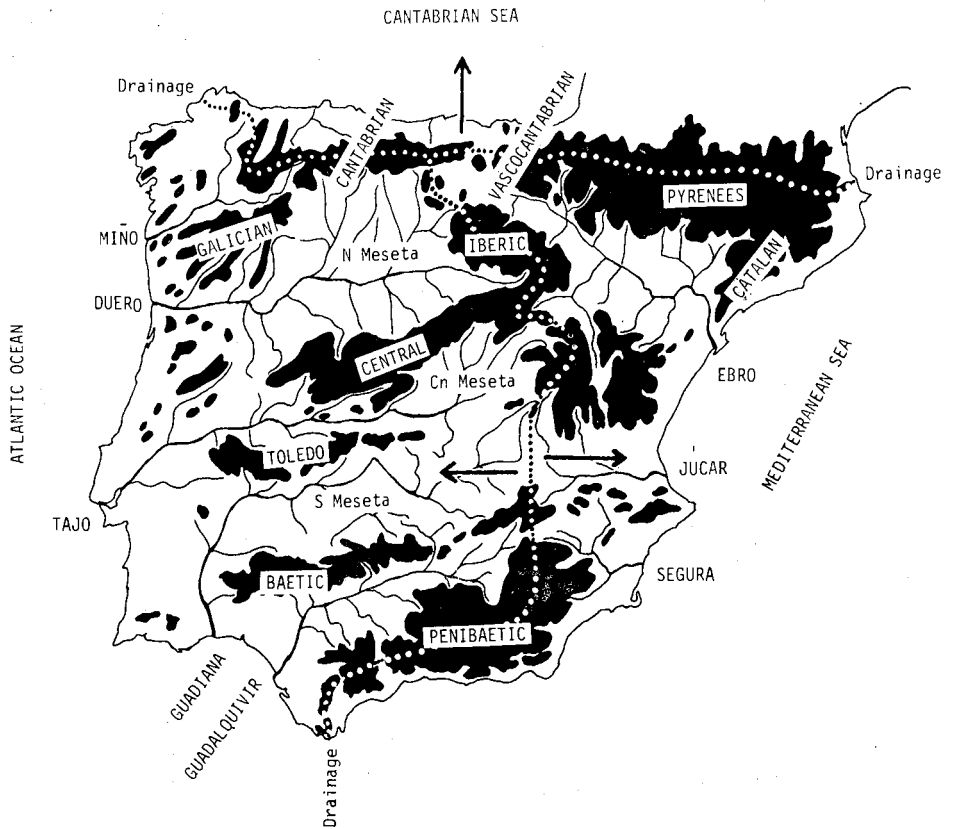


Fig. 1. Mountain ranges, rivers, and drainage pattern of Iberian Peninsula, after various sources.

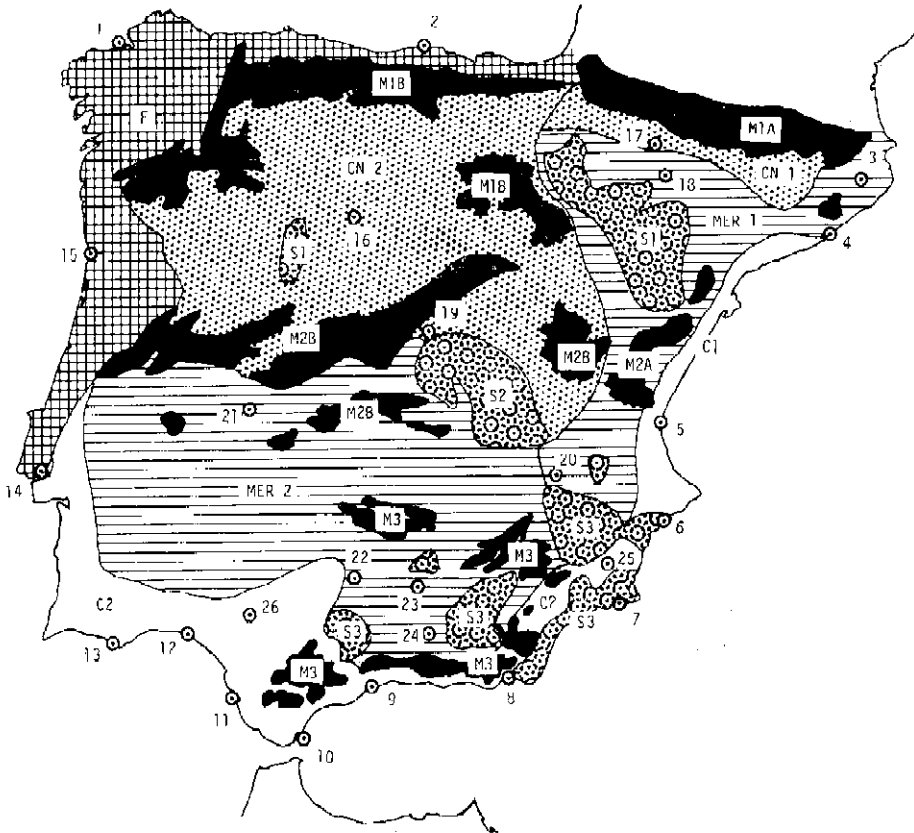


Fig. 2. Biogeographic regions of Iberian Peninsula, as recognized in this report.

Code:			
1. Ija Coruña	8. Almería	15. Oporto	22. Córdoba
2. Santander	9. Málaga	16. Valladolid	23. Jaén
3. Gerona	10. Gibraltar	17. Jaca	24. Granada
4. Barcelona	11. Cádiz	18. Huesca	25. Murcia
5. Valencia	12. Huelva	19. Madrid	26. Sevilla
6. Alicante	13. Faro	20. Albacete	
7. Cartagena	14. Lisboa	21. Cáceres	

F= Northwest Forest Region; M1A, M1B, M2A, M2B, & M3 – Montane Region; C1 & C2=Coastal Region; Cn 1 & Cn 2=Central Subregion; Mer 1 & Mer 2= Meridional Subregion; S1, S2, & S3=Steppe Region