families ; the composition of all Palmæ seed fats yet studied is remarkable for close quantitative similarity, with lauric (45–48 per cent) and myristic (16–20 per cent) as main components.

Ivanow and others have pointed to climatic temperature as the factor mainly operative in determining the relative saturation of seed fats. Production, in plants of cooler latitudes, of fats solid at the prevailing temperatures of the atmosphere is in any case not very probable ; but this is not evidence that the tropical temperature *per se* causes or favours development of the more saturated fats. Actually, many of the most unsaturated fats (those of *Aleurites*, *Hevea*, *Perilla*, *Licania* species, to quote only a few) are synthesised in the fruits of plants which can only live in tropical or subtropical conditions. On the other hand, in those plants which thrive both in either hot or cold climates, the investigators quoted have demonstrated a greater production of the characteristic unsaturated acids in seeds from plants grown in the cooler regions.

In a few cases, as in *Ricinus communis*, *Picramnia* sp. or *Aleurites montana* and *Fordii*, the seed fats of one or two species of a genus elaborate quite distinct fatty acids—in the cases mentioned, respectively, ricinoleic (hydroxy-oleic), tariric (acetylenic) and elaeostearic (conjugated triethenoid). The last-named is at present quite exceptional, since it is quite an unusual plant fatty acid, and has yet been observed (in each case in isolated species only) in the three distinct families Euphorbiaceæ, Rosaceæ and Cucurbitaceæ.

Although the biosynthesis of these specific fatty components places many of the higher land plant families apart from the rest of Nature as regards their fat types, we are left with the circumstance that the occurrence of these unusual features runs on the whole remarkably parallel with the groups into which morphologists have placed them. Apart from the widespread occurrence of specific component acids in certain plant families, there is observed a (probably gradual) simplification in fatty acid composition, commencing from the aquatic flora and proceeding in the direction of the fruit fats of the more highly developed land plants, similar to that which may be traced in the animal world. The facts to which attention is here directed illustrate that consistent and well-defined changes in biochemical as well as in biological conditions have accompanied evolutionary development in Nature.

Flora of the Sahara Mountains

By Dr. J. Hutchinson

UNTIL a few years ago, the flora of the mountains in the Sahara desert was practically unknown. Modern means of transport, however, have rendered access to these remote masses comparatively easy, and their vegetation has been fairly well investigated during the last ten years or so.

There are two main ranges in the middle Sahara (Fig. 1), the Hoggar or Ahaggar Mountains, halfway between Tunis and Nigeria, and in a direct line between them, and the Tibesti Mountains, on the western border of the Libyan desert, about five hundred miles north-north-east of Lake Chad. Due mainly to the work of French explorers and Prof. René Maire, of the University of Algiers, botanical science is now furnished for the first time with lists of the species known from these two mountain masses, which, so far as their plant-life is concerned, are like islands in a wide ocean, the 'ocean' in this case being the barren sands of the Sahara Desert. To the north of this desert is the rich Mediterranean flora and that of the Great Atlas Mountains, and to the south the vast tropical flora of Central Africa.

Prof. Maire, in a paper entitled "Études sur la Flore et la Végétation du Sahara central" (*Mém. Soc. Hist. Nat. Afr. Nord.*, No. 3 ; 1933), gives an account of the Hoggar Mountains flora, and last year there appeared his "Contribution à l'Étude de la Flore du Tibesti" (*Mém. Acad. Sci. France*, 62). The purpose of these notes is to compare the floras of the two mountain masses with each other and with the Mediterranean and tropical African floras to the north and south of them respectively.

Maire's contribution to our knowledge of the Central Sahara is an important one and is the result of a personal visit to the Hoggar Mountains in 1928 with a special mission organised by the governor of the territory. His account occupies 272 pages, and is illustrated by 36 photographs and 2 sketch maps. The coloured frontispiece of a lilac-flowered crucifer, *Moricandia arvensis*, DC., var. *garamantum*, Maire, shows how beautiful a flower-garden this arid region may become after rain, for it is the dominant plant of the 'acheb' on the Atakor plateau in the Hoggar Mountains. A white-flowered form occurs here and there. The

typical species is native of the Mediterranean; but this variety is endemic to the Hoggar region. From this sea of lilac rises the culminating Ilaman peak, about 9,000 ft. altitude.

Growing in association with this crucifer is a highly interesting Composite, *Pentzia Monodiana*, Maire, a representative of a genus only known previously from South Africa. Maire says of this plant: "Le *P. Monodiana* est la première espèce trouvée dans l'hémisphère boréal d'un genre jusqu'ici exclusivement austro-africain; il appartient certainement à l'élément orophile ancien de la flore africaine". I should interpret the presence of this plant somewhat differently, however, for a study of the phylogeny and relationships of the South African species of *Pentzia* suggests that *Pentzia* has probably been derived from *Matricaria* (Chamomile), lacking only the ray-flowers of the latter genus and being usually more woody. In consequence, I would prefer to regard this newly described species of *Pentzia*, not as a relic, but as a parallel development in the northern hemisphere and derived from boreal species of *Matricaria*, just as is probably the case of the genus in South Africa, for true *Matricaria* also occurs in the latter region. Species of *Pentzia* are dominant in some parts of the South African karoo, and provide valuable fodder in that arid region.

Among the more interesting woody plants of this supposed 'desert' region in the Sahara, there is an endemic cypress, *Cupressus Dupreziana*, A. Camus, known as 'tarout', a tree which was made known to botanists only a few years ago. But so early as 1864, Duveyrier noted the occurrence of a great forest of conifers on the southern slopes of Tassili, part of the Hoggar massif, and mistook it for the North African *Tetraclinis articulata*, Mast. (*Thuya articulata*, Desf.). It was not until 1925, however, during the expedition from Tunis to Lake Chad and Dahomey, that M. Lavauden, inspector of forests, collected portions of this conifer, which proved to be a new species of *Cupressus*. Unfortunately, he found it on the point of extinction, but he learned from the natives that it had at one time covered the slopes of Tassili. Now only a very few living examples remain among many dead stumps, some of which reach as much as twelve feet in diameter a few feet above the ground. To the layman the possibility of an evergreen forest in the middle of the Sahara seems somewhat fantastic; nevertheless, there it was a little more than seventy years ago, and but for the ravages of the Touaregs it would be there still. It furnished timber for building the habitations at Djanet and Rhât.

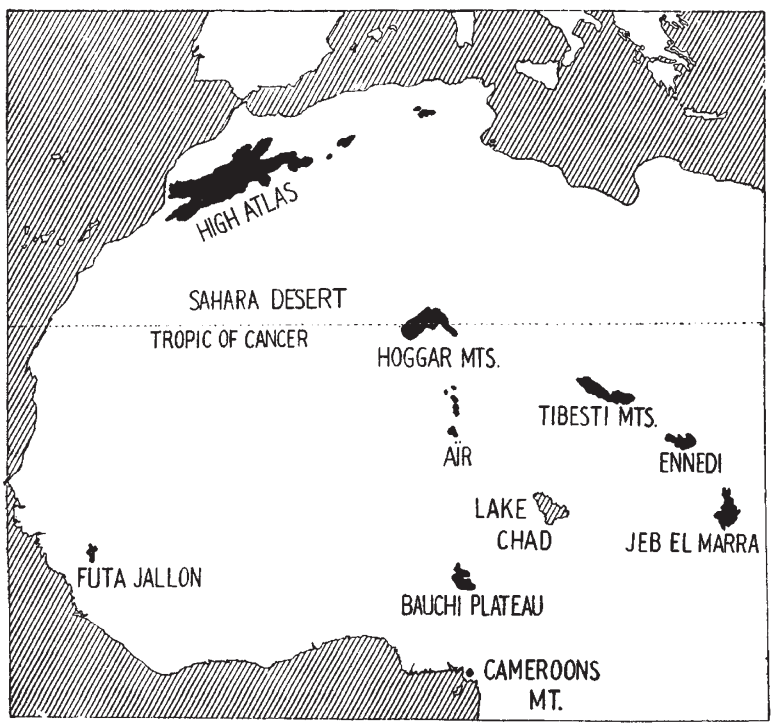

FIG. 1. Sketch map of north-west Africa showing the chief mountainous regions.

There are also three species of *Ephedra*, a genus typical of such regions. Besides the edible fig, *Ficus carica*, L., there are varieties of another species, *F. salicifolia*, Vahl, which occurs in Arabia and tropical Africa, and a third species, *F. ingens*, Miq., also very common in tropical Africa. A woody parasite is *Osyris alba*, Linn. (Santalaceæ), a Mediterranean species which imposes itself on a wonderful variety of hosts, for example, on such diverse plants as *Olea*, *Tamarix*, *Myrtus*, and even on *Scripus* (Cyperaceæ) and *Artemisia* (Compositæ). An interesting discovery is that of the Mediterranean *Clematis Flammula*, L., which is recorded for the first time at the foot of volcanic rocks in the Hoggar Mountains. There are a few woody Capparidaceæ, and as many as four species of *Acacia*, which provide food for camels and other animals, a species of *Retama* (*R. raetam*, Webb), and even a *Genista* (*G. uniflora*, Briq.). *Pistacia atlantica*, Desf. (Anacardiaceæ) is recorded from the Hoggar for the first time, very rare, and Prof. Maire regards it as a remarkable relict from the Mediterranean flora.

There is a variable and widespread species of *Gymnosporia* (*G. senegalensis*), and the usual species of Christ's thorn (*Ziziphus*), a species of *Grewia* (*G. populifolia*, Vahl), common farther south and extending eastward to India, seven species of *Tamarix*, and a few rock-roses (*Helianthemum*). The myrtle family is represented by an endemic species, *Myrtus Nivelii*, Batt. and Trab., and there is also a native olive, *Olea Laperrini*, Batt. et. Trab., about twelve feet high with a trunk eighteen inches in diameter, very closely related to the European olive, *Olea europœa*.

It may be said, therefore, that the ligneous plants of the Hoggar region show affinities with both the Mediterranean and tropical African floras.

The herbaceous vegetation is composed mainly of the most advanced families or of advanced genera which are widely spread from Morocco to Arabia and Sind. The dominant families are the Compositæ (about 60 species), Cruciferæ (35 species), Papilionaceæ (31 species), Chenopodiaceæ (22 species), Caryophyllaceæ (18 species), Boraginaceæ (13 species), Umbelliferæ (10 species), Labiatæ (10 species).

There are as many as ten species of Asclepiadaceæ, several of them widely spread from North Africa to as far as India; but there are two endemics, *Glossonema Gautieri*, Batt. and Trab. and *Caralluma venenosa*, Maire.

The family Malvaceæ, so common in the savannah region farther south, is very poorly represented, and Acanthaceæ not at all.

The flora of the Tibesti Mountain mass, so far as known, is poorer than that of the Hoggar. Four botanical collections have been made, by Nachtigal, General Tilho, Dalloni and Tarrieux. The range is volcanic and reaches an altitude of more than 10,000 ft., culminating in the peak called Emi Koussi. The best collection so far made is that of Dalloni, who reached an altitude of 7,700 ft., but in a poor season after prolonged drought. It is possible, therefore, that during a good season many more flowering plants would be discovered. The number of ferns and flowering plants recorded by Maire is 159.

Ephedra is represented by an endemic species (*E. Tilhoana*, Maire), and an endemic variety of *E. altissima*, Desf. (var. *tibestica*, Maire). The typical form of the latter is found also in the Hoggar and in North Africa. The Hoggar cypress has so far not been observed; but the interesting *Pentzia*, *P. Monodiana*, mentioned above, was collected by Tilho at about 9,000 ft. altitude. It is browsed by goats and donkeys.

A shrub common in tropical Africa, *Phyllanthus reticulatus*, Poir. (Euphorbiaceæ), is rare in Tibesti. The beautiful crucifer of the Hoggar, *Moricandia arvensis* var. *garamantum*, is absent; but there are two rock roses common to both mountain groups. Another interesting composite has been discovered in the Tibesti, besides the *Pentzia*, namely *Tibestina*, Maire, a new genus of the thistle tribe, and two interesting new Papilionaceæ, *Dichilus Dallonianus*, Maire, and *Lotus tibesticus*, Maire, the former claimed by its author to be of South African affinity, the latter allied to species from the Atlantic Islands.

Prof. Maire's two papers are notable contributions to our knowledge of the flora of the Sahara, and botanists will await with keen anticipation his third paper dealing with its phytogeography and a study of its vegetation.

Obituary

Prof. I. P. Pavlov, For.Mem.R.S.

PROF. IVAN P. PAVLOV, who died on February 27, was by common consent the doyen of physiologists. This position he achieved by reason of his great age, his great distinction, and his great vitality. His age was such—he celebrated his eighty-fifth birthday in 1934—that few living workers in Great Britain even came within measurable distance of being his contemporaries, whilst to most, Pavlov's early working years appeared to go back into a distant past. Yet even apart from that, Pavlov was to English workers a somewhat remote figure until within the post-War period*. This perhaps was because he was not a particularly good linguist: he spoke German and had worked in Germany, but he was never at home in English.

* Notwithstanding that Pavlov visited Cambridge in 1912 to receive an honorary degree.

Nevertheless, though not well known personally in England, Pavlov's name became one with which to conjure in the early nineties of last century as the result of his work on digestion. His book "The Physiology of the Digestive Glands" produced a profound impression throughout the scientific world, and at once placed Pavlov not only in the first rank of physiologists, but also of scientific men of whatever kind. So far as the technical side of Pavlov's work on digestion was concerned, the great progress which he made was due to his recognition of two principles: first, that the deductions from his experiments would be misleading if the animals on which those experiments were made were in pain or even in a disturbed mental condition; and secondly, that no better results could be obtained if the animals were under a general anæsthetic. Thus Pavlov set himself, by ingenious surgical methods, so to dispose the parts