



BOTANICAL STUDIES ON IRAN II. THE WESTERN TRADITION.

ii. The Western Tradition

Modern scientific study of botany in Iran and Afghanistan began in the 19th century. Earlier there had been surveys of medicinal plants and their effects, often based partly on ancient Greek sources; for example, medicines, sickness, treatments, plants, and animals were defined and described in terms of the four basic principles recognized in antiquity: dry, moist, warm, and cold.

Modern botany—including description of all plant species, their evolutionary relations within an established taxonomic system, distribution and biogeographical relations, ecological behavior, and ecophysiological demands—became possible only after comprehensive collections of plant specimens had been developed.

In the 1840s W. Griffith collected a large number of unknown plant types in various parts of Afghanistan (1847; 1848). About forty years later, in the spring and summer of 1879, J. E. T. Aitchison accompanied British troops under the command of General Sir Frederick Roberts as they advanced from the Korram valley into various parts of the mountains south of Kabul (Aitchison, 1880, pp. 1-3). In 1884-85 he was attached as botanist to the Afghan Delimitation Commission. On both trips he made extensive collections, totaling about 25,000 specimens, from a number of different districts (1880; 1881; 1887); they are



now kept at the Herbarium of the Royal Botanic Gardens, Kew, in London.

These and several other, smaller collections have been used subsequently as the basis for revisions in the classification of families or genera, and they still constitute important type material for taxonomic investigations. In this respect they provide a historical dimension to systematic botany.

In the first half of the twentieth century J. Bornmüller published a large number of papers on the flora of Iran, describing many new species and providing systematic and taxonomic studies of a number of plant groups. He made several trips to Iran, and his reports are particularly useful in that they permit the retracing of his itineraries (1911, 1937, 1938, 1940, 1942); he also drew on all the plant material available to him from other collections.

In the past forty years, as many remote regions have become accessible, collecting activity has increased, and much larger collections have resulted. In this respect, Iranian scientists have made major contributions (see iii below). The total number of specimens so far known from Afghanistan is about 130,000, approximately 25 samples per 100 km². The estimated total for Iran is 200,000 specimens, a “collecting density” of about 13 samples per km². Botanical investigation of countries like Iran and Afghanistan is normally very uneven, however, for two reasons. First, collecting is usually concentrated along good roads and in easily accessible areas. Indeed, some maps of the geographical distribution of given plant species seem to mirror the corresponding road maps. Second, it usually takes place in the normal flowering season, late spring or summer. Furthermore, some areas support a very high number of species, others (particularly desert areas) a much lower number. The “collecting density” is thus of only very limited utility.

Basic to all botanical work are systematic catalogues of regional plants. In the mid-19th century E. Boissier described a large number of new plant species from the East (1842-59). He subsequently issued the first flora of the area extending from Greece to eastern Afghanistan, *Flora Orientalis* (1867-88), a monumental work in Latin consisting of five volumes plus a supplement. For its time it was an outstanding work, with clear descriptions of all plants then known, which were, however, only a small fraction of those known today. Nor did the author use the dichotomous system of reference now considered indispensable.

For the Iranian botanical region as a whole the most important modern flora



is in the process of publication by K. H. Rechinger. Since 1964, 161 parts have been issued, covering about 90 percent of known plant families and about 80 percent of known species; in October, 1987, no. 162 was in press and nos. 163-65 in preparation. Generally each part contains the description of one plant family, though large families sometimes require more than one part.

Floras for countries adjacent to Iran are also important sources of information for the taxonomist, plant geographer, and botanist, both for their contents and as means of discovering pertinent earlier literature. Particularly valuable for comparative study are works by E. Nasir and S. I. Ali (175 fascicles published so far), each fascicle of which is devoted to one plant family in West Pakistan; P. H. Davis, covering the whole flora of Turkey, with one supplementary volume planned; V. V. Vvedensky (1941-62, on Uzbekistan; 1968-, on Central Asia in general, 3 vols. published so far); F. W. Nikitina on the Kyrgyz Soviet Socialist Republic; B. K. Shishkin on Turkmenistan; P. N. Ovchinnikov on the Tajik Soviet Socialist Republic (3 vols. published so far); and V. I. Grubov on Central Asia (6 vols. published so far). Aside from a study of the Wakhan corridor (Podlech and Anders), individual regions within Iran and Afghanistan have not yet been investigated systematically.

In addition to basic catalogues of materials, sound, detailed taxonomic treatments are prerequisite for research in any branch of botany. In recent decades several scientists have published systematic classifications of specific plant groups, mainly using specimens kept in museums in Vienna, Göteborg, Edinburgh, Munich, Berlin, Geneva, Paris, Helsinki, London (Kew Gardens), Leningrad, and Washington, D.C. Some plant genera are very difficult to treat taxonomically because of recent evolutionary changes. Often they include just those common plants that constitute typical semidesert and steppe vegetation. The genera *Artemisia*, *Astragalus*, *Oxytropis*, *Acanthophyllum*, *Acantholimon*, and *Arenaria*, for example, are very rich in species and give rise to taxonomic problems that have not yet been resolved (see Freitag, 1971a, 1971b; Gilli; Hedge and Wendelbo; Podlech; Podlech and Anders; Rechinger).

Large plants with colorful flowers attractive to horticulturists have been a focus of interest since early medieval times. Wendelbo has published a fascinating booklet, with many color plates, on the bulb plants of Iran (1977), of which the tulip is the most celebrated. It is said to have been taken to Constantinople from Persia, and, according to historical records, its introduction in the West should be credited to Ogier Ghiselin de Busbecq, Emperor Ferdinand I's ambassador to the court of Sultan Solaymān I. Busbecq



carried tulip bulbs with him when he returned to Vienna in 1554. It was the Dutch, however, who exalted the flower to heights of “tulipomania” in the 17th century, triggering such intense commercial speculation that a single bulb of a special variety is known to have brought a price equivalent to more than \$3,000 in 1634. Within a few decades gladioli, hyacinths, and other bulb plants, often originating in the Iranian highlands, were also being sold in Europe at extremely high prices.

The botany of the lower plants in Iran and Afghanistan—mosses, lichens, fungi, and algae—is very little known. W. Frey has made intensive studies of the mosses and, with H. Kürschner, has summarized the earlier bryological literature. The limited bibliography on lichens and fungi has been surveyed by S.-W. Breckle (1981a, pp. 89, 103f.).

Some general bibliographies on Iran and Afghanistan include botanical references (e.g. Field; Wilber). Among more specialized bibliographies the most recent is by M. Bierkamp, Frey, and Kürschner (updating Frey and Mayer), covering only geobotanical literature for the whole of southwestern Asia. Botanical references on Afghanistan have been compiled (Breckle, Frey, and Hedge), and Breckle has also given a general account of research on the flora and vegetation of Afghanistan (1981a). The Swiss documentation center *Bibliotheca Afghanica* located at Liestal (Switzerland) is also very helpful. Useful accounts of the natural vegetation of Afghanistan have been given by O. H. Volk (1954, p. 422) and in more detail by H. Freitag (1971a, 1971b). Frey and W. Probst have recently published a synopsis of the vegetation of Iran (1986). M. Zohary’s major work on geobotany is valuable for all of southwestern Asia. The periodical literature also includes a number of more specialized studies, limited to particular topics, small areas, or specific sets of local conditions. Plant associations in several distinct areas have been investigated by Freitag and his colleagues, as well as by Gilli, Mossadegh, Sabeti, and others (for references, see Bierkamp et al.). Freitag (1986) has surveyed the vegetation in the sandy areas of Iran, and Breckle (1983) has done the same for the deserts and semideserts of both Iran and Afghanistan. The general pattern of plant distribution has been covered by Hedge and Wendelbo.

Little is known of the ecological conditions and ecophysiological behavior of plants in the various vegetation types. Some initial investigations have been made in connection with the microclimate in deserts and mountain areas, mineral nutrition of plants and their growth responses, and tolerance for drought, heat, cold, and salt. All these factors have played important roles in



botanical research on other areas. The ecological conditions and microclimate in the high Hindu Kush were measured by Breckle (1973), who also published data on ion and salinity conditions in halophytes from saline areas (1981b, 1986; see also Carle and Frey).

In 1976 two new botanical journals began publication in Iran. *Acta Ecologica Iranica*, issued by the National University of Iran in Tehran, is devoted essentially to ecological matters; *Iranian Journal of Botany*, published by the Āryāmeh̄r Botanic Garden in Tehran, is devoted to plant taxonomy, anatomy, and geobotany. These two journals are important outlets for rapidly developing botanical research by Iranian scientists. The valuable contributions that local researchers can make to botanical knowledge are discussed by Davis and Hedge (1975, p. 331). Although their article is written primarily from a Turkish point of view, many of the topics covered are equally valid for Iran and Afghanistan.

The establishment of nature preserves and national parks in Iran and Afghanistan began only recently, when basic botanical knowledge had developed to the point at which it became possible at least to suggest the most typical and valuable areas for protection. In Iran the Department of the Environment established fifty-four such areas, totaling more than 4 percent of the entire surface area of the country. The Tūrān Biosphere Reserve, which was the largest (1,842,000 ha), and Kavīr National Park have already been the subjects of special botanical investigations, which demonstrate both the value of protecting these areas and the amount of useful work they make possible (Firouz, 1976; Firouz et al.). At present, however, it is not known how effectively protection is being maintained. In Afghanistan a few national parks were planned by United Nations officials (Larsson; Petocz), but it is not known whether the plans are being carried out.

Another field of botanical research is the use of plants for medicinal purposes. The drugs available in the *bāzārs* of the two countries are plentiful and varied, but not all are of local origin. Many drugs, especially those derived from tropical plants, come from the Indian subcontinent. Surveys on medicinal plants and their uses, as well as on the principles of compounding drugs, have been published by O. H. Volk (1955); J.-M. Pelt, J. C. Hayon, and M. C. Younus; and L. Fischer.

There is still a great need for more work in various branches of botanical science in Iran and Afghanistan, both in applied fields and in a growing



number of new areas of basic research.

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