

The Gums Ammoniac of Morocco and the Cyrenaica. (*Ferula communis*, L., var. *brevifolia*, Mariz; *Ferula marmarica*, Aschers. and Taub.)

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LVIII.—THE GUMS AMMONIAC OF MOROCCO AND
THE CYRENAICA.

(*Ferula communis*, L., var. *brevifolia*, Mariz ; *Ferula
marmarica*, Aschers. and Taub.)

OTTO STAPP.

The origin of the Gum Ammoniac of Morocco has, in spite of repeated attempts to clear it up, remained doubtful. On Lindley's authority it is very generally accepted as the resin of *Ferula tingitana* ; but Battandier * suggested already in 1889 that it was the produce of a form of *Ferula communis* which he called " β *gummifera*," and later Simmonds† came to a similar conclusion. Further, in 1892, Sir Joseph Hooker‡ pointed to *Ferula Linkii* as the probable source of the gum. He was led to this assumption by some specimens, then in cultivation at Kew, of a *Ferula* which had been received from Morocco as representing the mother plant of the gum ammoniac ; but as those specimens had not then flowered, an exact determination was not possible. They did so, however, before the year was over, and a drawing was made, which has been reproduced quite recently in the *Botanical Magazine*, tab. 8157. With its identification as a form of *Ferula communis*, the question as to the botany of the Morocco gum ammoniac is settled, and it is now possible to give a fairly complete account of the history of the drug. The early history of this gum, however, has been so obscure up to the present time that it will be necessary to deal first with its most recent phase. Having done that we shall be in a better position to interpret the very meagre accounts of earlier authors, and the relationship of the Morocco drug to the once so highly reputed Ammoniakon of Dioscorides.

* Battandier in Battandier and Trabut, *Flore de l'Algérie*, vol. i. p. 367.

† Simmonds in *Amer. Journ. of Pharm.* 1891, p. 76.

‡ Hooker fil. in *Bot. Mag.* tab. 7267.

RECENT HISTORY (from the beginning of the 19th century) OF
THE GUM AMMONIAC OF MOROCCO.

The first to call attention to the gum ammoniac of Morocco as a distinct drug was J. G. Jackson, in his "Account of the Empire of Morocco," published in 1809. In a second edition, published in 1814, the following account occurs on p. 136: "*Ammoniacum*, called *Feshook* in Arabic, is produced from a plant similar to the European fennel, but much larger. In most of the plains of the interior, and particularly about El Araiche, and M'sharrah Rummellah,* it grows ten feet high. The Gum Ammoniac is procured by incisions in the branches, which, when pricked, emit a lacteous, glutinous juice, which being hardened by the heat of the sun, falls on the ground, and mixes with the red earth below: hence the reason that Gum Ammoniac of Barbary does not suit the London market. It might, however, with a little trouble, be procured perfectly pure, by spreading mats under the shrubs to receive the gum as it falls. The gum in the above mentioned state, is used in all parts of the country for cataplasms and fumigations. The sandy light soil which produces the Gum Ammoniac abounds in the north of Morocco. It is remarkable that neither bird nor beast is seen where this plant grows, the vulture only excepted. It is, however, attacked by a beetle having a long horn proceeding from its nose, with which it perforates the plant and makes the incisions whence the gum oozes out." This description is accompanied by two plates, one representing a leaf (or portion of a leaf), and a fragment of the stem, whilst the other shows the insect † connected with the production of the resin.

Sprengel in his *Species Umbelliferarum minus cognitae* (1818), p. 88, ventured to refer Jackson's plant to *Ferula orientalis*, "although Jackson's figure is not perfect." Twenty years later the plant was met with again by Lieut. Washington, R.N., who mentions it repeatedly in his diary of a journey from Tangier to the City of Morocco and back. ‡ Thus, on page 127, he records "plants like fennel, called el clagh (gum ammoniac)" from the country to the south-west of El Ksar, and "a forest of el clagh (gum ammoniac); some plants ten feet high, stem five inches thick," from the narrow strip of land between Murja Ras ed Dowra and the sea. Then again on p. 151, he mentions "that gigantic annual also, the gum ammoniac plant, like fennel, already putting forth its shoots and feathery leaves," in the plains

* East of the lake Murja Ras ed Dowra.

† Jackson calls the insect 'Dibben Fashook.' Dr. Charles Waterhouse informs me that it has not yet been identified. He believes it, however, to be a carpenter bee (*Xylocopa*). Mr. Horace P. White (see p. 379) made efforts to obtain the insect, but writes that it has not been observed on the gum ammoniac plants near Rabat. Jackson's account of the insect reads very like that by Aitchison concerning the puncturing of *Dorema* by boring beetles and the subsequent exudation of resin. Other *Umbelliferae* are also attacked in this way, but though the flow of the resin may be stimulated by the boring of those insects, its production of course does not depend on their presence. Any wound, as for instance one caused by tapping, would have the same effect.

‡ Washington in Journ. Geogr. Soc. I., 1830.

between Wadi Umer Rebia and F'dalah. The first two observations are dated 14th and 15th of November, and 16th of November respectively, the last January 15th to 21st.

Lindley accepted Sprengel's identification of the plant yielding the gum ammoniac of Morocco. In *Flora Medica* (1838), p. 46, he says in a note on *Ferula orientalis*: "What is supposed to be this plant yields in the State of Morocco a gum resin similar to Ammoniacum; whence it has been thought to be really the origin of that substance, and I think with good reason, so far as the drug of Dioscorides is concerned"; and in 1846 he repeats this view in his *Vegetable Kingdom* (ed. I., p. 776): "*Ferula orientalis*, which still furnishes a drug of the kind (*i.e.*, of Gumm ammoniac) in the Kingdom of Morocco." The same passage also occurs in the third edition of the *Vegetable Kingdom*, published in 1853; but in the same year, Pereira, in his *Materia Medica* (vol. III., p. 1715) inserted a note by Lindley—here reproduced—in which the mother plant of gum ammoniac is referred to as *Ferula tingitana*:—"I am indebted to Dr. Lindley for a fine sample of African Ammoniacum (*Ἀμμωνιακόν*, Diosc.). It was sent by W. D. Hay, Esq., the British Consul at Tangier, to the Hon. W. T. Fox Strangways, and is marked, 'Gumm Ammoniac or Fusogh, Tangier, 17 June, 1839, J. W. D. H.' It is an oblong piece, about three inches long, and one-and-a-half inches thick, and broad. Its weight is about 830 grains. Externally it is irregular and uneven, and has a dirty appearance, similar to what ammoniacum would acquire from repeated handling and long exposure to the air in a dusty situation. It is partially covered with paper. A few pieces of reddish chalky earth (which effervesces with acids) are found sticking to it, thus confirming the account given of it by Jackson, though the quantity of this on my specimen is not sufficient to affect in any way the saleability of it. It appears to be made up of agglutinated tears, like the lump Persian ammoniacum. Internally it has very much the appearance of lump ammoniacum, but is not so white, but has a brownish, reddish, and in some places a faint bluish tint. Its odour is very faint, and not at all like Persian ammoniacum. Heated on the point of a knife, its distinction from Persian ammoniacum is very obvious. Its taste is also much slighter than that of the commercial ammoniacum. Rubbed with water, it forms an emulsion like the latter. It is the produce of *Ferula tingitana* (Lindley)."

What may have induced Lindley to change his opinion is not quite clear, unless he had found out that *Ferula orientalis* was not a native of North Africa, whilst *Ferula tingitana* was indigenous in Morocco, and in fact was, at that time, the only species of *Ferula* known from that country; but then Jackson's figure of the Fashook plant should have been sufficient to make this identification at least highly doubtful. However that may be, Lindley's last view has been adopted by most subsequent writers.

Meanwhile Hanbury* had on several occasions received samples of Morocco gum ammoniac, some of which had been

* Hanbury in Journ. Pharm. Sec., March 22nd, 1873, p. 741; Science Papers, pp. 375-379.

imported from Mogador, and having enlisted the services of his friend Dr. Leared, he ascertained through him the following particulars* : "The plant is called *Kelth*, and grows up rapidly after the first rains. Its gum is not much shipped to Europe, but a great deal of it is taken by pilgrims to Egypt and Mecca, where it is used as incense. Its chief shipping port is Mazagan; a little is sent from Mogador, but none from other ports. The *Greatham Hall*, the vessel in which Dr. Leared embarked, took on board 25 serons of the gum at Mazagan for Gibraltar, where they were to be reshipped for Alexandria. The shippers call it *Fasoy*." Dr. Leared also procured rootstocks of the plant for the Botanic Gardens at Kew and Regent's Park, but they did not grow.† In his book "Marocco and the Moors" (1876), Leared also mentions (p. 356) the plant, and says that he was informed that the Fashook plant grows at a place two days' journey from Mogador, on the road to the city of Morocco. Referring to this statement Sir Joseph Hooker,‡ however, remarks: "We, on the other hand, were persistently assured that it grew nowhere along that route, nor nearer to it than El Araiche, north of Marocco city. And this is confirmed by information obtained by Mr. R. Drummond Hay to the effect that it is found near Marocco, and chiefly around Tedla. The Moors who gave us this information at once recognised the figure by Jackson, and called the plant Kilch (*Kelth* according to Leared)."

Dr. Leared's account is of so great interest that it has seemed worth while to reprint it almost in full. In the second edition of his book (1891), p. 345, he refers to the gum as follows:—*FASHOOK*—*Ferula* species—Gum ammoniac. Called *Fasoy* by the European merchants and *Kelth* by the Moors. It is abundant in Woled Bu Sba, two days' journey from Mogador, on the road to the city of Marocco. It grows very quickly after the first autumnal rain. A stalk obtained at Mogador was one inch and a quarter in diameter. Before parting with it the Moor broke off a portion, intending, as he said, to fumigate his sore eyes. Some roots procured by Signor R. Elmaleh were of the size and shape of carrots, of a blackish-brown colour, and studded over with numerous warty projections. When broken they exuded drops of milky juice which formed yellowish-white opaque tears. The taste of this gum resin was slightly bitter, with considerable acidity. A single fennel-like leaf accompanied the roots—it was evidently the leaf of an umbelliferous plant. It was found that the taste of this gum resin differed from that of a specimen of African Ammoniacum in the museum of the Pharmaceutical Society. . . . It seems probable, therefore, that African Ammoniacum is produced by more than one species. . . . On account of its adhesiveness the gum is used by the Moors as a depilatory. The seed when heated over a fire until it becomes glutinous is used as an application in skin diseases. Very little ammoniacum is sent to Europe. It is chiefly shipped from Mazagan to Gibraltar for reshipment to Alexandria; a little is sent from Mogador, and none from the other ports. . . . The

* Hanbury, Science Papers, 1.c.p. 377.

† Bentley & Trimen, Med. Plants, 1880, sub no. 129.

‡ Hooker & Ball, Marocco and the Great Atlas, 1878, p. 386.

Arabian physician Serapion, writing at the commencement of the ninth century, mentions two kinds of ammoniacum, the best sort of which was produced from the root of a plant found in Crete, and an inferior kind of which he says: 'Sed illud quid continet terram et lapides, nominat chironia et defertur a terrâ quae dicitur Monacon et est succus plantae, simili plantae galbani in similitudine suâ et nascit ibi.' This description agrees with the present Morocco product, and Monacon may be an early name for that country. It is observable that Serapion calls ammoniacum 'raxach.* . . .'. That Leared had in view the same plant as Jackson is evident from the specimen which, in 1875 (?), he communicated to D. Hanbury, and which is still preserved in the herbarium of the Pharmaceutical Society. It consists of a leaf, and may be the very one mentioned by Leared as having been with the root which Signor R. Elmaleh acquired. On the other hand it is quite true that otherwise the *Ferula* has never been recorded from or collected in the district Woled Bu Sba, which is traversed by the much frequented road from Mogador to Morocco City (Marakesh).

In 1884 another attempt was made to introduce the plant into Kew, Mr. Horace P. White having kindly sent rootstocks of the plant obtained from near Rabat. They were placed in the succulent house, but seem to have soon been lost sight of. Later in the same year Mr. White communicated a dried specimen with mature fruits also from Rabat, but they do not seem to have germinated. Mr. George P. Hunot, British Vice-Consul at Saffi, was, however, more fortunate, for he succeeded at last in sending rootstocks to Kew which were vigorous enough to strike. They arrived in January, 1886, and year after year threw up fine tufts of leaves, until in December, 1892, one of the plants flowered. It had stood outside in the sun for a few weeks in the summer, and it is this plant which forms the subject of plate 8157 of the *Botanical Magazine*. It will be useful to add here some passages from Mr. Hunot's letters to Sir W. T. Thiselton-Dyer, referring to the plant under consideration.—Letter dated Saffi, October 30, 1885: "On my return, however, I sent a Jew to the district where the gum is produced, and he has brought me two roots which I am forwarding by steamer for you. If this is the right kind, then you may be sure that large quantities of gum could be produced, as the tree grows in many places. I have lots on my own grounds that come up annually and produce large stems; in the hot season you can distinguish gum on the stems when they begin to dry. But the gum is secured by the Arabs by digging around the roots of the trees in the hot season, and piercing them, when the gum oozes out of the trees near or where the incision is made." Letter dated April 1, 1886 (referring to a sample of gum, bought at the City of Morocco): "You will see that the Arabs take no care in gathering it. They make an incision in the root, which they previously uncover, and in the great heat the gum oozes out, but gets mixed with dirt, as

* Leared's quotation from Serapion is not quite correct. I am not aware that he mentions Crete as the country whence the best ammoniacum comes, and as to Monacon, this is no doubt a corruption of Ammoniacum. I shall have to revert to Serapion's account in another place.

generally during hot weather there is a strong wind blowing. You will find it therefore mixed with dirt, but that is the state of the gum as a rule when sold." On January 6, 1887, he once more reverts to the subject: "The Fassook in this country commences to grow and push forward leaves in the latter part of November or early in December, and dies apparently in the latter end of August, leaving the canes of 7-8 feet in height dry with seed on them. In December again the same root pushes out leaves and commences to blossom about April."

To summarise briefly the information brought together in the preceding paragraphs, it is evident that a *Ferula* occurs in Western Morocco from the Wad el Kos, the river of El Araiche, to the Wad Ummer Rebia, and possibly still farther south. From this plant, when mature, a gum resin, known as gum ammoniac of Morocco, is obtained, which exudes either from the wounds caused by the boring of certain insects or by the tapping of the collectors. The resin is used in Morocco both medicinally and for fumigations, and is also exported to Egypt and Arabia, mainly from Mazagan. The vernacular names are given as Fashook (also spelt Feshook, Fasshook, Fasook), El clagh, Kelth, and Kilch.

EARLY HISTORY OF THE GUM AMMONIAC OF MOROCCO.

The vernacular names quoted in the preceding paragraph may be reduced to two, namely:—Fashook and K'lakh. The other ways of spelling are either due to dialectal variations or to different and no doubt in some cases faulty transliteration. From a note on Mr. White's letter of June 3, 1885, we learn that Fashook is really the name of the gum, while the plant itself is called K'lakh. Now, in the work of Ebn Baitar*, a Spanish Moor who wrote in the thirteenth century, the following information is given under Kalh; "Kalh-*Ferula communis*. This plant is called El-Kinnat by the peoples of Andalusia, which name I have already mentioned under the letter Kaf. With the Egyptians this word designates gum ammoniac, with which I have dealt under letter A under the word Oshak." El Kinnat is evidently the Kana, of which Ebn Baitar says†: "Kana-*Ferula communis*. This plant is known by the name El Kalch in *Western Afrika*, and the Greeks call it Nardex." Of Oshak, however, he says‡: "Oshak-Gummi Ammoniacum. This gum is also called Oshadsch and Woschak§ and Lizak el dsalab, Chrysocolla." There is no doubt that the K'lakh (c'lagh, Kilch, Kelth) of the Moors of today is identical with the Kalh (Kalch) of Ebn Baitar, just as the modern Fashook corresponds to his Woshack (Washack, Oshak). Thus it is evident that the gum ammoniac plant of Morocco and its gum resin were known in Morocco at least six hundred years ago under the names which they still bear. The name Kana is preserved in the Spanish Canaheijo (giant cana), the common modern name for *Ferula communis*. Ebn Baitar does not say explicitly that the Egyptians of his day

* Ebn Baithar, *Grosse Zusammenstellung der Heil- und Nahrungsmittel*. Übersetzt bei J. V. Sontheimer, ii., p. 388.

† Ebn Baithar, l.c. ii., p. 326.

‡ Ebn Baithar, l.c. i., p. 48.

§ In the index Waschak stands for Woschak.

imported the gum from Morocco or "Western" Africa, but he was evidently convinced that their Kalch and Oschak was identical with the El Kalch and Cana of West Africa, which must have been familiar to him. As *Ferula communis* does not occur in Egypt and no form of it is known to produce gum resin in quantity nearer than Morocco and the adjacent districts of South-Western Algeria, the inference is suggested that a trade in Fashook gum from Morocco to Egypt existed in the middle ages. This is the more probable when it is remembered how close were the relations between North-Western Africa and the eastern centres of Islam after the conquest of Mauretania by the Arabs.

But it does not necessarily follow that all the Oshak which reached Egypt and, through Egypt, Europe, came from Morocco, nor that the terms Oshak and Kalch applied originally to the Morocco article. It has indeed been suggested that the African ammoniacum first mentioned by Dioscorides was very early supplanted by the Persian ammoniacum, the resin of *Dorema ammoniacum*, and that the Arab translators and commentators of Dioscorides, being partly Persians themselves, erroneously extended the Persian vernacular Ushaq to the African ammoniacum, including that of Dioscorides. This leads to the question as to what was the ammoniacum of Dioscorides.

THE AMMONIAKON OF DIOSCORIDES.

This is what Dioscorides says of his Ammoniakon, omitting the purely therapeutical part :—"Ammoniakon [is a herb from which the ammonian incense is gathered ; some call it agasyllon, some criotheon, or heliustrum, and the Romans gutta] : and this is the latex of a *Ferula* which grows in the Cyrenaica. The whole plant, including the root, is termed agasyllis. To be approved it should be of good colour, free of wood particles and stonelets, resembling tears of incense, pure and dense, free of impurities, smelling somewhat like castoreum and bitter of taste. This kind goes by the name of *thrausma* (fragments, analogous to the 'ammoniacum in lachrymis' or tears of modern pharmacopoeias), whilst the other, which contains particles of soil and stonelets, is called *phyrama* (cake, 'analogous to the ammoniacum in placentis seu massis, or 'lump ammoniacum'). It is produced in Libya in the neighbourhood of the Ammon temple, and is the latex of a tree *ferula*. It is a mollient, epispastic and calefacient, and a diaphoretic for hard and soft tumours. . . ." The above translation is from Sprengel's edition of Dioscorides, vol. I., p. 439. The paragraph agrees in all essential points with the text in the so-called *Codex Vindobonensis* (C), where it is accompanied by a somewhat crude, but characteristic, figure (tab. 46). This throws much light on the plant which Dioscorides, or at least his interpreters up to the beginning of the 6th century, had in view under the name of ammoniakon. It represents a whole plant with four basal leaves, four short, racemously arranged flowering branches supported by inflated sheaths and a terminal inflorescence. The leaves are about half as long as the flowering stem, and each possesses three pairs of opposite segments of the first order ; these segments are themselves bipinnati-partite and ovate in outline ; the segments of the last (third) order are lacinate with few very short, divaricate lobes. The large, inflated sheaths or spathes at the base

of the branches bear reduced blades resembling the terminal segment of the ground leaves. Each of the flowering branches has a similar but smaller spathe on the side facing the stem. The compound umbels, evidently in the first stage of flowering, are much contracted and compact, and supported at the base by a few minute subulate or linear leaflets. It is clear that the figure represents a *Ferula*, and also that it cannot be *F. tingitana*, in which the ultimate leaf segments are much broader. Nor can it be the ordinary *Ferula communis*, which has very much longer and finer laciniae. It might represent the variety *brevifolia* of *F. communis* but for the less delicate and less numerous laciniae. *F. tingitana* and *F. communis* have been collected in the Cyrenaica; but there is a third species recorded from the Cyrenaica, namely, *F. marmarica*, Aschers. and Taub., which was discovered by Dr. P. Taubert in 1887, near Bomba, about 160 km. to the east of ancient Cyrene, and also by Dr. G. Schweinfurth at Badia. It is not well known and there are no specimens of it at Kew.

Dr. Schweinfurth was, however, kind enough to send me his material, consisting of leaves and young inflorescences, while Mr. W. Barbey and Mr. G. Beauverd courteously lent me some infructescences, collected by Dr. Taubert and preserved in the Herbarium Boissier. The former was particularly valuable, as it represents the plant in exactly the stage in which the ammoniakon of the *Codex Vindobonensis* is drawn. Holding the Badia plant and the plate in the *Codex* side by side, one is struck at once by their remarkable resemblance, although the leaves, in the picture, come out much less "compound." Indeed, as far as the figures of the *Codex Vindobonensis* go—and many of them, in spite of a certain crudeness, are very true—that of the ammoniakon, if it is intended for *F. marmarica*, may be pronounced as one of the best. There is, moreover, some circumstantial evidence for the theory of the identity of *F. marmarica* and Dioscorides' ammoniakon plant. Taubert†, in his account of an excursion to the western Marmarica, describes the appearance of *F. marmarica* near Bomba and the use to which it is put, in this way: "The most characteristic plant of this stony littoral plain is a *Ferula*, subsequently recognised as a new species (*F. marmarica*, Aschers. & Taub.), of which I had already seen ball-shaped masses rolling before the wind on the sandy shore after the fashion of 'wind witches.' It was only after prolonged searching that I found a few specimens of it still standing in their places with some dried up leaves and young fruits‡, and, by their habit, reminding me very much of *Drias* (*Thapsia garganica*). Whence came then the numerous loose specimens, found on the shore, of a plant so rarely met with *in situ*? The mystery was solved when I came across a soldier who was busy collecting a resin which exuded from thick roots cut close to the ground and emitting a strong umbelliferous odour. My suspicion that they belonged to the *Ferula* was confirmed by the man, and I was told that the soldiers of Bomba and the few Bedouins that live there cut the plant—which is said to be more common farther eastward

† Taubert in Bull. Herb. Boissier, v. i., p. 447.

‡ The observation was made on June 4th.

—at the rootstock soon after flowering and cover it in with a sort of roof made of flat stones. Then they return after a while to gather the copiously exuding resin, which is at first of a bright and afterwards of a dirty yellow. It burns readily, leaving behind a not unpleasant smell; it serves for lighting fires and, made into candles, as a very poor illuminant. It is also a reputed medicine, but unfortunately I was unable to learn of its application. . . . Under the name of '*fassúch*' it is an article of trade and is sent far, as, for instance, to Derna." The eastward distribution of the plant is confirmed by Dr. Schweinfurth's discovery of the plant at Badia, about 100 km. east of Bomba, where it was just beginning to flower on the 10th of March,* and was known by the Arabic name of Kalch. In connection with Taubert's account of the tapping of the root, I would refer in this place to a passage in Serapion's paragraph on ammoniakon,† where he says "on the authority of Dioscorides" :—" Hec herba grece dicitur asios cuius radix vulneratur egreditur lachrymus qui colligitur et servatur." The gum obtained in the manner described by Taubert would no doubt be of the "phyrama" kind (ammoniacum in placentis). It is apparently at present quite unknown in Europe and has, of course, never been analysed. There were, however, a few small drops of resin on the dry infructescences in the Herbarium Boissier such as would be classed as 'thrausma' (ammoniacum in lachrymis). They were of a deep yellow colour resembling amber. I tasted one half of one of them and burnt the other. The taste was moderately bitter without any subsequent addition of acidity, whilst the odour was decidedly stronger and pleasanter than that of burning Morocco Fashook.

Thus we still have in the Cyrenaica, the home of the Ammoniakon of Dioscorides, a *Ferula* very much resembling, if not identical with, Dioscorides' plant and producing a gum resin of the same kind as that described by him. The plant and its product go by the same name as the Morocco *Ferula* and its gum resin, Kalch and Fashook. There is, therefore, no reason to doubt the correctness of Dioscorides' account. The destructive method of tapping may have contributed much to the reduction of the area of his ammoniakon. It has, for instance, not been observed by recent explorers in the neighbourhood of the site of the old Ammon temple, where, almost more than anywhere else, it must have been exposed to the danger of extirpation by the gum collector. At the time when Ebn Baitar wrote, the Cyrenaica formed part of the Egyptian Ayyubi caliphate, and the "Egyptians" of whom he says that they designate gum ammoniac by the name Kalch which is also Ushaq, no doubt meant rather the Cyrenaican than the Moroccan gum although it is, of course, quite possible that they also received a certain quantity of the latter without distinguishing clearly between them. It appears therefore that the terms Kalch and Ushaq (Fashook) became *nomina generica* at a very early date, just as the name gum ammoniacum is used at the present day for at least three distinct umbelliferous gum resins.

* Schweinfurth and Ascherson, *Primitiae Florae Marmaricae*, in *Bull. Herb. Boiss.* vol. I. pp. 442, 649.

† *Ortus Sanitatis, Matthaei Silvatici* (1511), cap. xlv., and *Liber Serapionis Agregatus*, transl. Symon and Januensis (1473), cap. 254 (in contracted Latin).

ORIGIN OF THE VERNACULAR NAMES.

If the names Kalch and Ushaq (Fashook) were *nomina generica* as early as the beginning of the 13th century, where did they originate and what was their original meaning? To answer this question the assistance of the linguist has, of course, to be called in, but up to a certain point the botanist is able to prepare the way. We find the name Kalch—i.e., the name of the plant already mentioned in Ebn al Awwâm's 'Book of Agriculture'*—(10th to 12th century) and in Assaf's (the Jew's) list† of medicines (10th or 11th century). In the latter it occurs as an Aramaic name and synonym of Ammoniakon. As the Aramaic language was already dying out at the time when Assaf wrote, we may assume that its origin lies much further back. Löw interpretes Kalch as 'cava arundo,' so that its application to ammoniacum-yielding *Ferulas* is a parallel to that of Kana (*canna arundo*), both being descriptive of the full-grown stems of those *Ferulas*. The term Kalch takes us back therefore to one of the oldest members of the Semitic languages, and there can be little doubt that it was in use for the Cyrenaic ammoniacum plant long before it found its way into Morocco with the Arab conquerors. With the tenacity which characterises vernaculars connected with oriental folklore it has survived not only in Morocco and the Cyrenaica, but also further east on the frontier of Egypt and Syria where Ascherson found this name applied to a third species of *Ferula*, possibly *F. sinaitica*. As to Fashook, I have already stated that it is evidently only a slight variation of the Arabic Ushuq or Ushaq which appears as Woshak and Washak with early writers. The first authors to mention it are probably Honain Ben Isahâq (9th century) and Mazargawaih or Mohammed Ben Zakaria (9th to 10th century), both quoted by Ebn Baitar.‡ Then we find it in the 10th century with Mowafik§ in his *Liber Fundamentorum* (about 975), and after that with practically all the Arabic writers. Through Serapion the younger, a contemporary of Ebn Baitar, (13th century) it found its way into the books of the school of Salerno|| and into Matthioli's commentary of Dioscorides. In the former it occurs as "vasac" or "fasaac (fasac)" and in the latter as "raxach seu assach" or "assac"; "raxach" being obviously a misreading for "vaxach." I cannot venture to discuss the etymology of Ushaq and its variations; but I may perhaps be permitted to call attention to the following fact. Dioscorides calls the plant, according to the *Codex Vindobonensis* (C) and the usual editions of his *Materia Medica*, Agasyllon or Agasyllis, a name which has, so far as I know, not been explained, nor can it be connected with one of the vernaculars which subsequently came into use. Serapion, however, who most probably knew another version

* See Löw, *Aram. Pflanzennamen*, p. 340.

† See Löw, *l.c.* p. 25, 340.

‡ Ebn Baithar, *l.c.*

§ Mowafik, *Liber Fundamentorum*, Ed. Seligmann, p. 35; ed. Achundow, p. 154.

|| e.g. *Ortus Sanitatis*, ed. Mentz, 1485, cap. xliii; ed. Jac. Meydenbach, *Moguntiae*, 1491, cap. xlv; ed. Matthaei Silvatici, 1511, cap. xlv.

¶ Matthioli, *Comment. Dioscor.*, ed. 1565, p. 803.

of Dioscorides' work, says, as already quoted (p. 383) "auctoritate Dioscoridis":—"hec herba grece dicitur *asios* . . ." Cannot the grecianised *Asios* and the Arabic *Assac* or *Assach* (*Ushaq*) have the same derivation from some libyan or old semitic vernacular, then in use in the home of the Cyrenaic ammoniacum plant?

It is frequently stated that *Ushaq* was originally the Persian name for the gum resin of *Dorema ammoniacum*, and erroneously transferred to the Ammoniakon of Dioscorides by the early Arabic writers, some of whom were Persians. Dymock* especially assumed that Mowafik (about 975 A.D.) in his paragraph on *Ushaq* meant the Persian and not the African drug. It is true that Seligmann in his translation of Mowafik's *Liber Fundamentorum* (p. 35) quotes under *gummi ammoniacum*: "Nota marg. Wesche, persice idem"; but Achundow has it not. It may be a later addition and mean no more than that the Persians call Dioscorides' gum ammoniac *Wesche*. There is otherwise nothing in Mowafik's paragraph which would suggest that he meant by *Ushaq* the Persian gum ammoniac. On the contrary, he adds "vocatur a Graecis *afarikun*" (African), which remark would certainly have challenged an explanation if he had had the Persian article in his mind. Nor is there in the later Arab writers any definite reference to a *Persian Ushaq*, and it appears to me more probable that the Persian Pharmacopoeias transferred the name *Ushaq* from the Arab literature to their own ammoniacum plant, the *Dorema ammoniacum*. The *Ulfaz Udwiye*h of Mohammed el Shirazi (about 1450) has (no. 160) actually *Ushuck* as an Arabic name, whilst the Persian equivalent is given as 'Se-mugh te-ra-tees' and 'Se-mugh bil she-reen.' It is true, the same book mentions later on (no. 1134) *derukht ushuk* as the Persian name of the tree which produces the gum ammoniac, but this means simply *Ushuk tree*, 'derukht' (*daracht*) being Persian for tree.

EXPORT.

The Ammoniakon of Dioscorides, Plinius and the later writers up to the conquest of the Cyrenaica by the Arabs, came no doubt from the ports of the Cyrenaica such as *Darnis* (*Derna*), *Platea* (an island in the Gulf of Bomba), &c., and from Alexandria, the great trade emporium of the Levant. The export to Europe continued, though much reduced, after the advent of the Arabs and their subsequent supercession by the Turks; for the drug was always more or less in demand for medicinal purposes. But apart from an occasional reference to Alexandria†, as the port from which it was shipped, and repetitions of Dioscorides' statement that it was gathered in the Cyrenaica, nothing more definite can be learned from mediæval and renaissance writers. Even Pomet in his '*Histoire des Drogues*' (1694), and Tournefort in his '*Materia Medica*' (1708), and Lemery in the '*Dictionnaire des Drogues*' (1698), fail to advance our knowledge on that point, and Linnæus himself in '*Materia Medica*' (1749), p. 182, still quotes

* Dymock, Warden and Hooper, *Pharmacograph. Ind.*, vol. ii, p. 157.

† Matthioli, *Comm. Diosc. ed.* 1584, p. 379, says, "Very little comes to us from Alexandria in tear shape. Mostly it is impure, like pitch, and in compact masses."

“Lybia, Barca, Aegyptus occidentalis,” as the country of origin for *gummi ammoniacum*. Nowhere can I discover the slightest reference to Morocco as another source of the drug, although it is very probable that when once the Morocco Fashook reached Alexandria it got mixed up with the Cyrenaica resin and followed the same trade channels. One thing is certain, however, that the drug, from wherever it may have come, was nearly always the coarser kind, the ammoniacum in lumps, with plenty of impurities.* Meanwhile the Persian drug, the gum resin of *Dorema ammoniacum*, crept in as a substitute for the African article unnoticed by the European pharmacists. Valentini (1732)† appears to have been the first to record it, although he himself was not aware of its distinctness from the ammoniacum of Dioscorides; but his words, “magnis frustris multa alba grana includentibus ex India Orientali in Europam fertur,” leave no doubt that it was the *Dorema* resin to which he was referring. This came by way of Bombay and Alexandria, but part of it may have also come overland, as is suggested by a passage in Murray’s *Apparatus Medicamentorum* (1792), vol. vi., p. 190: “Per Turciam ad nos transfertur, item ex India orientali,” although the gum received “per Turciam” may have been in part Cyrenaica or Morocco gum. It was only then that attention was concentrated on the Persian article, with the result that its source was at length discovered in *Dorema ammoniacum*, and it has practically crowded out the African product from the European market.

The Morocco Fashook was first noticed, as already stated, by J. G. Jackson in the early years of the last century. Attempts to secure a place for it in Europe have been made repeatedly but with little success, owing, no doubt, to the extremely crude method of preparation. Considerable quantities of it were exhibited at the Vienna international exhibition of 1873. Vogel‡ described them as cakes, several kilograms in weight, made up of a dark brown mass consisting of lumps of resin, of the size of a walnut or less, soil, sand and fragments of the plant. The principal shipping port for Morocco gum ammoniac is Mazagan, whence it goes mostly via Gibraltar to Alexandria. Small quantities are also exported from Mogador.

CHEMISTRY.

I have already observed that the chemistry of the gum ammoniac of the Cyrenaica is absolutely unknown. The Morocco gum has been examined repeatedly, but its exact constitution is still uncertain. By treating it with molten potash, G. Goldschmidt§ obtained resorcin and a crystallised substance of the formula $C_6H_3O_5$, which melts at 265° , and its aqueous solution turns a beautiful red on the addition of chloride of iron. Hirschsohn|| found umbelliferon in it, whence Tschirch is inclined to place it next to Galbanum. The taste of the Moroccan

* See footnote on p. 385.

† Valentini, *Hist. Simpl.*, p. 279.

‡ See Wiesner, *Rohstoffe d. Pflanzenreichs*, 2nd ed., v. i., p. 201.

§ See Wiesner, *l.c.* v. i., p. 205, and Tschirch, *Die Harze und Harzebehälter*, 2nd ed., p. 339.

|| See Tschirch, *l.c.* p. 340.

gum ammoniac is less bitter and much less acrid than that of the Persian, and the odour of the burning gum resin is more pleasant. If alcoholic ammonia is poured over the former a bluish fluorescent liquid is obtained, which is not the case with *Dorema* gum. On the other hand, the colour of the Moroccan ammoniacum remains unaffected by a solution of chloride of lime, whilst the Persian gum assumes an orange colour.

BOTANY.

In the text accompanying plate 8157 of the *Botanical Magazine*, I have given a succinct account of the taxonomic position of the plant yielding the gum ammoniac of Morocco. To conclude the present article, it will be useful to repeat, and slightly extend, what has been said there. The earlier identifications with *Ferula orientalis* and *F. tingitana* may be dismissed without further comment (see p. 377). It is quite certain that the plant belongs to *Ferula communis*, L. (sensu lat.), and the only question to discuss is the place and name which it should be given within this taxonomic unit.

Ferula communis has a wide range in the Mediterranean countries, from the Canaries and Portugal to Constantinople, Asia Minor and Syria, but with the exclusion of Egypt. It is subject to a certain amount of variation, particularly in the length and width of the ultimate segments of the leaves, the size and also, within narrow limits, the shape of the fruits and the number of intravallecular vittae. It is the leaves which interest us most in this place. In typical *Ferula communis*, as it first became known and as it occurs commonly in Southern Europe, the ultimate leaf segments are generally over 2 cm., and frequently over 3 (up to 5) cm. long, with a width of 1 mm. or less. Occasionally, however, individuals occur with much shorter segments, that is, of less than 1 (to 0.5) cm. in length, and 0.5–1 mm. in width. Such specimens were described in 1820 from Portugal as *Ferula brevifolia* by Link in Roemer and Schultes' *Systema* (vol. VI., p. 592), and in Hoffmensegg and Link, *Flore Portugaise* (vol. II., p. 416, tab. 108); then, in 1842, from Sicily, as *Ferula nodiflora*, by Gussone in his *Flora Sicula* (vol. I., p. 353); in 1846, from the Canaries as *Ferula Linckii* by Webb and Berthelot in their *Isles Canaries* (*Phytographie*, vol. III., p. 160, tab. 75); and in 1848, from Southern France, as *Ferula nodiflora* var. *monspeliensis* by Grenier and Godron in their *Flore Française* (vol. I., p. 692). It appears under still another name in Buch *Beschreibung der Kanarischen Inseln* (1825), where Link enumerates it (p. 132) as *Ferula aurea*, adding as synonym *Peucedanum aureum* (auctorum),* under which name it had been figured a few years previously (1821) in the *Botanical Register*, tab. 559, from a specimen introduced into Lambert's garden at Boyton in 1790. No other character, except the less saturated green of the foliage, is adduced by the authors mentioned to separate the plant with the short leaf-segments from *Ferula communis*, and the more modern floras enumerate the form with the short segments as a variety of *Ferula communis*. I have, indeed, in the Botanic

* *Sic, he does not give Solander as the authority.*

Gardens at Kew, repeatedly seen leaves representing the common and the *Linkii* type of leaf in the same individual, and I was inclined to drop the distinction of the short-segmented form, even as a variety, if it had not been for the fact that the *Linkii* type is the only form of *Ferula communis* which I have so far seen from Morocco, although specimens from Morocco, under cultivation, sometimes show an approach to the typical form, as may be seen from the *Botanical Magazine* figure. It may be that in Morocco the *Linkii* type has become more fixed and has grown into a distinct race, characterised at the same time by a more abundant production of gum resin. Battandier and Trabut record from the south-western part of Algeria a variety of *Ferula communis* which they characterise merely by stating that "it exudes from the stems, and often also from the tips of the leaf-segments, a copious gum analogous to gum ammoniac, and possibly identical with the Fushog of the Moors." I have seen no specimens of this plant which they mark simply as "*β gummifera*," and have for the present preferred to accept Mariz's name for the variety, namely, *brevifolia*. As to the plant that produces the Cyrenaica gum ammoniac, I would refer to what I have said concerning its appearance in the paragraph on the Ammoniakon of Dioscorides, for it is obviously a quite distinct species.

LIX.—VISIT TO NEWPORT AND SOUTH WALES.

W. DALLIMORE.

The contribution of an exhibit to the forestry section of the "Bath, West of England, and Southern Counties Agricultural Societies' Show" by the Director of the Royal Botanic Gardens, Kew, furnished the object for my visit to Newport in June. After the necessary work attached to this exhibit was accomplished, I was able to go and see several gardens of interest during the show week, and the appended notes are the outcome of my journeyings.

FORESTRY EXHIBITION.—Although it is only the second year that the subject of forestry has formed one of the distinct features of the "Bath and West" show, it has excited a considerable amount of interest among landed proprietors, and a great many exhibits were got together on this occasion. These exhibits were of both educational and commercial value. On the one hand, the effects of culture on various trees were well shown—such as good and bad planting, pruning, the rate of growth of various timber trees on different kinds of land and at varying altitudes, &c., and the effect and treatment of insect and fungus pests. On the other hand, planks of home-grown timber, with the approximate ages of the trees, were shown; samples of various woods in the rough, planed, and polished; gates, window frames, doors, fencing suitable for farm work, all from home-grown timber, with details of cost. Then again timber showing the advantages accruing from treating with creosote previous to use, and various other items. During the exhibition lectures and demonstrations were given on various operations connected with forestry.

THE HENDRE.—On the outskirts of Monmouth, about two miles from the centre of the town, an entrance is gained to the park which