degradation of the side chain of stigmasterol (VI)* to a substance having corpus luteum hormone activity[15]. Adopting the technique of Fernholz[16], Butenandt and his collaborators converted stigmasterol into a hydroxy-bisnorcholenic acid (VI; but with side chain degraded to $-CHMe.CO_2H$). By a further series of changes this acid was converted into the hydroxyketone (VII), which on mild oxidation gave a mixture of substances. The lowest melting fraction from the mixture (m.p. 129°–135°) had corpus luteum hormone activity in doses only slightly greater than those required with the pure hormone. The report of the isolation of a chemically pure substance from this mixture will be awaited with interest. It may well be that the day is not far distant when the three sex hormones (androsterone and progestin as well as œstrin) will be available for clinical use in chemically pure crystalline form.

* It should be observed that the positions assigned to the hydroxyl group and the nuclear double bond of stigmasterol are based on analogy with cholesterol; there is no experimental justification for this assumption.

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Use and Origin of *Yerba Maté**

By CAPT. T. A. JOYCE, O.B.E.

THE origin of the practice of infusing the leaves of the ilex is very obscure. The earliest mention of the drink I have quoted is from Nicholás Durán (1626–27). By that time, as the extract shows, the beverage had spread far and wide through South America. But there is no account of its discovery. Pinelo, writing in 1636, refers to an author, Robles Cornejo, where he says a full account of the herb is given. Cornejo's work, "Examen de los Simples Medicinales", dated 1617, must contain the first reference to the drink. But the book existed only in manuscript and, though mentioned in Cejador y Franca's "Historia de la Lengua y Literatura Castellaña", has absolutely disappeared.

So far, evidence would seem to show that the drink was a native discovery, developed by the Jesuits; but a study of the early history of the country provides another aspect. The Rio de la Plata was discovered by Juan Diaz de Solis in 1516. In 1534, an expedition was sent from Spain under Pedro de Mendoza to make permanent occupation of the country to the north. With him sailed Ulrich Schmidt, or Schmiedel, as he was called by the Spaniards, a Bavarian agent of merchants in Seville. He ascended the Paraná and Paraguay with the pioneer expeditions and made many journeys of exploration through the heart of the Guaraní country, finally making a cross-country journey of some hundred and thirty miles from the upper Paraná to São Vicente; then he returned to Europe after an absence of nearly twenty years.

Schmidt's reminiscences are remarkable from several points of view, and perhaps especially for the accuracy of his memory and the almost incredible vileness of his orthography in dealing with Spanish and Indian words. His narrative is of great importance to anthropology, because it is the report of a pioneer and an observer. Whatever he may have forgotten, his mind is extraordinarily clear on the food question. He writes in detail what he had to drink and eat and where, day by day. Naturally, food was very important, and these European expeditions, living on the country, were often on the verge of starvation. For days they had to pass through unoccupied country, and their minds were naturally focused on the food quest. Schmidt tells how the Carios make 'wine' of Mandepore (manioc) and of honey; the Mbaia and Payagua, of 'fenugreek'; the Guyacurú, of the algarroba bean. But in none of his copious food notes does he ever make mention in his twenty years' experience of the use of the ilex leaf either chewed or infused.

During the period of Schmidt's residence in Paraguay, Cabeza de Vaca was sent to the country as Adelantado. From São Francisco, in the far south of Brazil, where he landed, he made a remarkable overland journey to the newly founded settlement of Asunción, passing through the heart of the country where the ilex grew naturally. In the course of his three years' residence he made several journeys northward. His narrative (1555) is full of details of considerable ethnographical importance and, though he pays less attention to local foodstuffs than Schmidt, the precarious nature of his supplies led him to record much useful information on this subject. Yet in his account there is no mention of the ilex.

* *Continued from p. 724.*

Between 1569 and 1574, Nicholas Monardes published a work entitled "Las cosas que se traen de nuestras Indias occidentales", translated into English in 1580 under the far more attractive title "Joyfull Newes of the New-found World". He gives an extended and delightful description of the properties of coca, tobacco and many other American products, but there is no mention of *yerba maté*.

Diaz de Guzman (1612) gives a descriptive account of practically the whole region occupied by the Spanish east of the Andes in his "Historia Argentina" (Paraguay did not become a separate province until 1620), but there is no mention in his pages of the 'herb of Paraguay'. Thus the first reference to the use of the ilex leaf does not occur in literature until more than ninety years after Schmidt entered the country, eighty-five years after Cabeza de Vaca passed through the forests which later became the principal source of supply, and more than half a century after Monardes had published his series of monographs on the economic contribution made by the newly discovered Americas to the Old World. The lost MS. of Cornejo might supply the information as to the origin of the commercial use of the 'herb'. But the inference is, on the evidence, that the leaf was not in general use by the natives prior to the establishment of the Jesuit missions, except, perhaps, for chewing.

The native name of the dried leaf gives little help. In the Guaraní dialect the principal varieties were known as *Caamini* and *Caaguazú* (in Brazil, *Congonha*).

The tree itself was known as 'caa', which simply means a tree, a generic term, and it is easy to produce parallels from other native dialects that no plant of importance is mentioned except by a specific name. The implication is that, as far as the natives were concerned, the ilex was merely a tree.

It has been suggested that the word 'caa' bears some relation to the Chinese 'c'ha', meaning tea in the Pekinese, Mandarin and Cantonese dialects. Tea was first brought to Europe by the Dutch in the early seventeenth century from Bantam, whither it had been imported by Chinese merchants from Amoy, where it was called 'té'. The Portuguese found it in Macao, under the name 'c'ha', a little later. The first mention of tea in Western literature is in Maffei's "Historica Indica", published in 1558. It is not inconceivable that the Jesuits of the period, looking for a substitute for tea, by then introduced into southern Europe, also introduced the Chinese word, which was mis pronounced by the natives.

The subsequent development of the *yerbales*, or ilex plantations, is a matter of history. The economic importance of the leaf, combined with the fact that it grew in the less accessible regions (swampy mountain valleys), soon led to the inception of attempts to bring it under cultivation. Rodero gives the account of the first attempt.

Young trees were brought from Maracayu to the mission communities along the Paraná river, but did not flourish. Experiments in raising seedlings were also a failure. The eventual success is recorded by Dobrizhoffer (1749), who reports that the seed of the ilex is covered with a thick coating of gluten which prevents germination. In the wild state, this gluten is removed by passage through the bodies of certain birds, principally the South American pheasant (jacu). This gluten was eventually removed by careful washing and the seed sown deep in ground drenched with water. The young seedlings were planted out in deep trenches under thatched shelters. Yet, even after these precautions, the cultivated plants never attained the size of those growing under natural conditions. However, the "Handbook of Paraguay" (1894) states that the Jesuit attempts were so successful that at Santiago (Paraguay) there once existed a grove of 20,000 trees. On the expulsion of the Jesuits, these plantations disappeared, and only in recent years have successful *yerbales* been established in the Misiones territory of north-eastern Argentina.

The ilex tree remained without any name assigned by international botanists until the nineteenth century; and it was by a curious piece of bad luck that the famous French botanist, Dr. Bonpland, was prevented from having the honour of classifying *yerba maté*. Bonpland went, in the year 1820, up-river from Buenos Ayres to Paraguay, with the object of obtaining specimens of the plant; but Paraguay, always isolated, was under the dictatorship of that extraordinary individual José Gaspar Francia, whose policy put a fence round the little country. Bonpland was placed under a kind of arrest, detained for many years, and while he was still practically a prisoner of Francia's, *yerba maté* had been seen by Saint Hilaire in South Brazil, in the Curityba region, identified as a member of the ilex family, and named by him *Ilex paraguariensis*. Saint Hilaire afterwards changed the name to *Ilex maté*; but meanwhile, in 1824, A. B. Lambert, the distinguished English botanist, described the tree, illustrated it, and gave it the name *Ilex paraguayensis*, by which it is now usually known.

The subject with which I have been dealing may seem, at first sight, to be a little removed from anthropological studies; but I would suggest that the study of ethno-botany is of the highest importance. The rapid spread of stimulants, narcotics and food plants throughout the world has a direct bearing on culture-diffusion. But trouble arises

from the fact that valuable food plants spread so rapidly that their origin becomes obscured—especially cereals. Maize, to give one example, indigenous to America and unknown in the Old World before Columbus, became the staple food of half Africa within a century of the discovery, spreading from tribe to tribe, far beyond European exploration. In Europe it penetrated to the Levant, and became known in France as *blé de Turquie*. In Germany it was called *türkische Weisen*. In England it was called guinea corn, because it came to us from West Africa. I suggest that there is a splendid opportunity for a young man, trained in botany, to undertake the revision of that fine work "The Origin of Cultivated Plants" written by Alphonse de Candolle. The last edition of this was published in 1909, but the preface, written in 1882, is a model of sympathetic guidance to those who follow. Much has been discovered since de Candolle's day, and a new edition is badly needed. I hope that some of the younger men may take up the task.

A Marsupial Sabre-toothed Tiger from South America*

THE marsupial or pouched mammals of Australia are well known to include groups which are parallel in form and habits to many groups of the higher mammals living in the rest of the world. The pouched mammals of South America, both past and present, are less varied and represent only insect-eaters and flesh-eaters. Among the latter, however, Dr. Elmer S. Riggs has just described perhaps the most remarkable mimic of a higher mammal hitherto discovered. In a Pliocene deposit in Catamarca, northern Argentina, he has found the remains of a pouched mammal which nearly resembles the familiar Machærodonts or 'sabre-toothed tigers', but is clearly inferior in the less efficient adaptations of its skeleton to its mode of life.

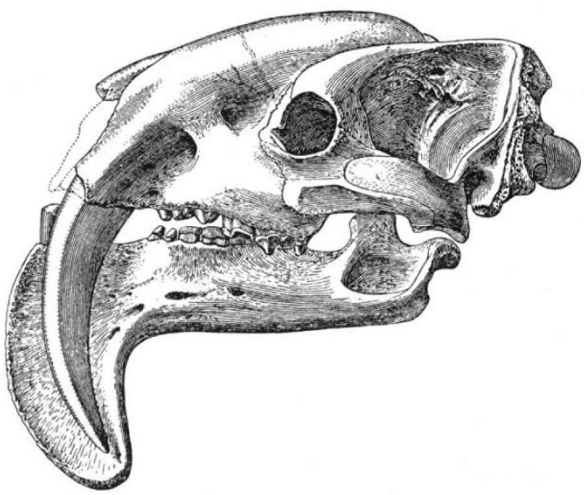

FIG. 1. Side view of skull of *Thylacosmilus atrox*. Holotype No. P 14531 Field Museum. Reproduced from *Field Mus. Geol. Ser.*, **6**, 61, Dec. 11, 1933.

Of *Thylacosmilus*, as Dr. Riggs names the new mammal, most parts of the skeleton are now in the Field Museum of Natural History, Chicago. The skull, which is shown in side view in Fig. 1, measures from 8 to 10 inches in length, according to the species; and the head and trunk would have about the same relative proportions as in a leopard. The great canine tusks differ from those of the ordinary sabre-tooths in having an open pulp-cavity enabling them to grow throughout life; and the maxillary bones which enclose their roots grow upwards and backwards over the forehead to accommodate them. These tusks are not quite sabre-shaped, being flattened triangular in section, and the enamel which only incompletely covers them is very thin. They are very feebly and finely serrated on the edge. There are no incisor teeth, and the molars and premolars are as small and inefficient for cutting flesh as those of their contemporary relatives, the Borhyænidæ—very different from the powerful corresponding teeth of the true sabre-tooths. There is a bony post-orbital bar, evidently to strengthen the side of the skull; and the back of the head is shaped for the insertion of strong neck-muscles. The lower jaw is remarkable for the large size of the pair of bony flanges which protect the tips of the canine tusks. They are larger than those in any of the sabre-tooths.

The hinge of the lower jaw on the skull, however, is almost exactly as in the sabre-tooths, and the mouth could be opened as widely as in them to allow the tips of the tusks to be used. The neck vertebræ are large and strong for the origin of the powerful neck muscles which would be needed for the thrusting of the tusks. The feet, however, are astonishingly different from those of the sabre-tooths, for they bear only pointed toes, not grasping claws.

As Dr. Riggs points out, the discovery of *Thylacosmilus* is all the more remarkable because among the numerous fossil mammals known from the older Tertiary rocks of Argentina there are no recognisable ancestors in which the canines are gradually enlarging. It shows that the deposits hitherto explored contain only an imperfect record of the extinct mammal fauna, and that much may be expected from future discoveries. A. S. W.

* Elmer S. Riggs, "A new Marsupial Saber-tooth from the Pliocene of Argentina, and its Relationships to other South American Predacious Marsupials" (*Trans. Amer. Phil. Soc.*, n.s., **24**, pt. 1; 1934).