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THE ORIGIN AND DISTRIBUTION OF
CYNODON DACTYLON (L.) PERS.

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The Origin and Distribution of *Cynodon dactylon* (L.) Pers.

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Although *Cynodon dactylon* is now cosmopolitan it is generally recognised that its present distribution has been achieved with the aid of man. Other species of *Cynodon* are not widely distributed in nature although some have been introduced to various countries. The greatest concentration of species is in Africa, whence *C. plectostachyus* has been introduced to India and Australia, and *C. incompletus* to New South Wales, where it is now naturalised. There are no endemic species of *Cynodon* in Australia, the several species recorded in the Flora Australiensis having been transferred to other genera.

Merrill (1941) regarded the absence of any reference to *Cynodon dactylon* in the early literature pertaining to Tropical America as "clear evidence that it is, here, a plant of relatively recent introduction." Macoun (1888) stated that *Cynodon dactylon* was introduced with ballast and became naturalised on Vancouver Is., Canada, and its introduction to Hawaii in 1835 is recorded by Degener (1936). The grass was listed among the naturalised plants of New Zealand by Cheeseman (1906). To these areas then the grass can be regarded as introduced.

Cynodon dactylon was collected in Australia by Robert Brown during the period 1802-1805 (Brown 1810). The possibility of the grass being an introduced one was mentioned by Brown (1814). Woolls (1867) in a paper on the botany of the Parramatta district wrote that *Cynodon dactylon* was rapidly replacing the native grass *Themeda australis* in grazing areas, and stated that although Robert Brown had collected the grass, many persons considered that it was an introduction from the East Indies. Rodway (1903) considered that *Cynodon dactylon* in Tasmania was "possibly indigenous; but introduced near centres of population." The collection made by Brown in the early years of Australian settlement and later observations on the ubiquity of *Cynodon dactylon* leave doubt as to whether the species was indigenous or an introduction.

Bews (1929) thought that *Cynodon dactylon* was probably a native of the Mediterranean region, though he conceded that it might be indigenous in South Africa and elsewhere in the Southern Hemisphere. Merrill (1941) thought that from generic distribution alone, one might accept *Cynodon dactylon* as of Old World origin. Furthermore he declared it to be unquestionably of Indo-Malayan origin.

Because there is some difference of opinion concerning the origin of *Cynodon dactylon* and because the status of the species in the Australian flora is still in doubt, mycological evidence has been sought which might elucidate these problems.

From Host Indexes and Lists of Fungi published in various countries, the range of several parasites of *Cynodon dactylon* has been ascertained. Some fungi are recorded from dead tissues of the grass, and have been disregarded as they are saprophytes of only chance occurrence on the host. Other species recorded on the grass are fungi with a plurivorous habit, e.g., *Sclerotinia homeocarpa* and *Sclerotium rolfsii*. No significance can be attached to fungi of this category. The present distribution of six parasites of *Cynodon dactylon* is given in Table I. The fungi recorded in Australia and the New World are species which could

easily be introduced on living plants of *Cynodon* or which might be introduced with dried grass used as hay or packing material. The smut might be readily introduced by spores on seed, or in living plants. It is easy to visualise this casual introduction of the grass to a country as a weed in containers of soil used for the importation of living plants, and such chance plants of *Cynodon* might possibly be infected with rust or leaf-spot fungi as well as smut. Ergot is not likely to be introduced in this way. It must be regarded as seed-borne (sclerotia mixed with seed) and there is then the necessity for coincidence of flowering of the host and discharge of ascospores from ascostromata developed from the sclerotia. Absence of ergot is not to be taken as a criterion of introduction of the host. It is apparent though that the introduction of an ergot along with its host presents much greater difficulty than would be the case with rust, smut, or leaf-spot fungi.

The absence from Australia and the New World of parasites of *Cynodon dactylon* whose dispersal presents difficulties is indicative of a restriction of the grass to the Old World (excluding Australia) until the aid of man enabled the grass to achieve its present range. That the several parasites of the grass have such a wide range in the Old World suggests that *Cynodon dactylon* had spread through Europe, Asia and Africa in early times accompanied by its parasites. *Claviceps pusilla*, with *Bothriochloa* and *Themeda* among its hosts, extends from Europe, through India, to Australia, and this ergot, and its hosts, must have achieved their present range at a time when Australia had some land connection with other land masses. That *Claviceps cynodontis* did not reach Australia suggests that its advent to the area bordering the Western Pacific Ocean occurred relatively late. Even if it were proper to suggest an area of origin based on present day geographic regions, the evidence would not support Merrill's contention of an Indo-Malayan origin for *Cynodon dactylon*.

In Australia the only fungal parasites of *Cynodon dactylon* are a rust and a smut, fungi whose arrival contemporaneously with the introduction of the host, or at a time subsequent to the host's original entry, is quite feasible. If *C. dactylon* were indigenous it must be assumed that it became established in Australia at a time when a land connection with other parts of the Old World was in existence. In that event, the grass either spread to Australia leaving its ergot behind, or the ergot evolved in the Old World in a period subsequent to Australia's being isolated by an ocean barrier. A late development of *Claviceps cynodontis* seems unlikely in view of its wide distribution.

Doubt does prevail concerning the status of *Cynodon dactylon* in Australia, and I consider that the mycological evidence is in favour of the view that the grass is introduced. If it is accepted that *Cynodon dactylon* is an introduction, there is no difficulty in accounting for it in the collection of plants made by Brown in the early years of the nineteenth century. Ships arriving in Australia in the late eighteenth century had visited Africa, Southern Asia and the East Indies, and it is quite possible that seed or living plants of the grass were brought here with food for livestock or in the soil around living plants. The ease with which *Cynodon dactylon* can establish itself in a great variety of habitats at the present day is an indication of how readily the grass may have gained a foothold in the first decade of the colonisation of Australia by Europeans.

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TABLE I

	Europe	South Africa	Tropical Africa	India, Ceylon & Burma	Philippine Is.	Australia	U.S.A.	West Indies
<i>Ustilago cynodontis</i>	+	+	+	+	*	+	+	
<i>Puccinia cynodontis</i>	+	+	+	+	+	+	+	+
<i>Septoria cynodontis</i>	+						+	
<i>Helminthosporium cynodontis</i>		+	+				+	
<i>Phyllachora cynodontis</i>	+	+	+	+	+			
<i>Claviceps cynodontis</i>	+	+	+	+	+			

* *Ustilago cynodontis* has not been reported from the Philippine Is., but *Sorosporium cynodontis* Ling. has recently been described from *Cynodon dactylon* in Luzon, P. I. (Sydowia, 3, 131-2, 1949).