

tante collection de documents scientifiques, sous forme d'échantillons d'histoire naturelle, de croquis, de notes sur le pays, sa flore, sa faune et ses habitants. Le plus riche trésor dont il a enrichi la science, est un registre d'observations météorologiques extrêmement complètes et consciencieusement rédigées.

Tous les herbiers BRIART retrouvés dans les collections du Jardin botanique national de Belgique ont été récoltés au cours de l'expédition DELCOMMUNE, mais les dates renseignées dans le Sylloge sont quelque peu fantaisistes; par ailleurs, le Sylloge renseigne une seule espèce, *Carpodinus lanceolata* K. Schum., comme ayant été récoltée non pas au Katanga, mais à Mange, Kasai, vraisemblablement une escale sur la rivière Kasai au cours du voyage de retour. La carte indique les lieux de récolte avec les coordonnées géographiques et l'année de la récolte.

Sans doute l'intérêt de PAUL BRIART pour la botanique lui fut-il transmis par son grand-père ALEXANDRE BRIART (décédé en 1896) qui fut chirurgien aux armées belgo-hollandaises, puis médecin de plusieurs charbonnages du Centre (STOCKMANS, 1901); botaniste amateur et ami de FRANÇOIS CRÉPIN, il était membre de la Société royale de Botanique de Belgique, comme son petit-fils dont le nom figure dans la liste des membres à partir de l'année 1880. En 1951, Mr. LÉON ADANT-BRIART, de la Hestre, a fait don au Jardin botanique des collections d'ALEXANDRE BRIART, soit quelque 600 plantes de Belgique et 250 autres, notamment de Suisse. A. BRIART fut, semble-t-il, parmi les premiers à étudier les collections de son petit-fils, comme le suggèrent notamment la description écrite de sa main qui accompagne le type de *Mellera briartii*, ainsi que les commentaires, à l'encre noire, intercalés dans le cahier de P. BRIART, et concernant les no. 29, 59, 60 et 61.

Rappelons pour terminer que P. BRIART a écrit plusieurs articles sur des sujets variés, et notamment botaniques; on trouvera la plupart des titres dans JANSSENS & CATEAUX: 325-326 (1909).

OUVRAGES CITÉS:

- BRIART, P. (1892), in Le mouvement géographique 9 (33): 149-150.
 DE WILDEMAN, E. & DURAND, TH. (1899). Matériaux pour la flore du Congo, 6. Bull. Soc. Roy. Bot. Belg. 28 (2): 210.
 DURAND, TH. & H. (1909). Sylloge Florae Congolanae (Phanerogamae): 1-716.
 GÉRARD, A. S. (1948). Briart (Paul) in Biographie coloniale 1: 171-173.
 JANSSENS, E. & CATEAUX, A. (1909). Les Belges au Congo 33: 321-326.
 STOCKMANS, F. (1961). Briart (Alphonse) in Biographie nationale 3: 124-127.
 VAN DER STRAETEN, E. (1951). Delcommune (Alexandre J.P.) in Biographie coloniale 2: 258-262.

INDIA IS THE NATIVE HOME OF THE PIGEONPEA

L. J. G. VAN DER MAESEN

Germplasm Botanist, Genetic Resources Unit
 International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
 Patancheru P.O. 502 324, Andhra Pradesh, India

ABSTRACT

This paper adds information relevant to the question: 'What is the native home of the pigeonpea?'. This question was posed by OZA (1972) and evidence has accumulated in favour of an Asiatic origin of *Cajanus cajan* (L.) Millsp.

1. ORIGIN OF THE PIGEONPEA

OZA (1972) briefly reviewed some of the literature on the origin of the pigeonpea (*Cajanus cajan* (L.) Millsp.), a topic that has interested many scientists and on which there are many opinions. ICRISAT's attention was drawn to this interesting question in the course of its crop-improvement programs and in particular while collection, conservation, and utilization of *Cajanus* genetic resources was in progress (VAN DER MAESEN, 1976). More-detailed reviews were prepared by DE (1974) and VERNON ROYES (1976). The latter considered the dispute settled in favour of Indian origin. The large diversity and presence of many wild relatives in India (*Atylosia* spp. and other members of the subtribe *Cajaninae*) were the main reasons for various authors (VAVILOV, BURKILL, MURDOCK, (see DE, 1974) and LACKEY, 1977) to settle for an Indian origin. Absence of reports of wild plants of *Cajanus cajan* in India originally induced DE CANDOLLE (1883) and his several followers to favour an African origin.

BRUCHER (1977) still favours African origin because of the presence of a single endemic West African species, *Cajanus kerstingii* Harms.

2. OCCURRENCE OF WILD PIGEONPEAS

OZA (1972) appealed to naturalists to look for truly wild pigeonpeas, for truly wild *C. cajan* had not been found. Pigeonpeas growing wild were usually in circumstances where they had clearly escaped from cultivation, particularly in Africa. Pigeonpea, especially the perennial cultivars, is able to propagate itself. Very old perennial plants

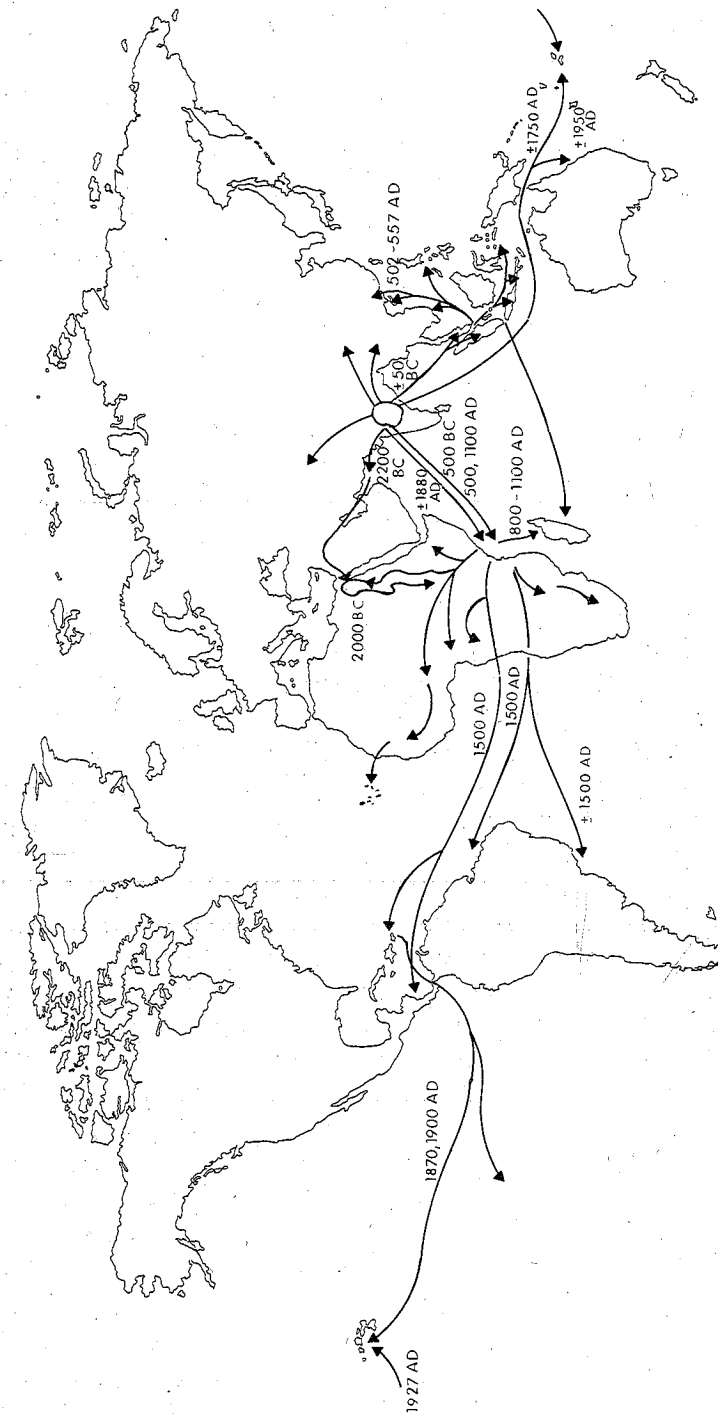
can be found, e.g. in Kenya, mainly in mixed cultivation or in back-yard plots. In India these also occur as a backyard vegetable crop, especially in tribal areas. In the Cumbum area of Kurnool district, Andhra Pradesh, a remnant population is reported from cultivations abandoned longer than sixty years ago by settlers who were evicted after illegally occupying forest land (L. J. REDDY, pers. commun.). On one of my own trips I observed *C. cajan* growing wild at about 1000 m altitude on Horseley Hills in the Chittoor district of Andhra Pradesh. I found plants along the roadside, with seedlings clustered together where pods had dropped. Obviously, seeds could have been spilt when being transported along the road. Grazing is not intense along these roads. The plants grew in the bushes close to the road and deeper inside as well. COLLETT & HEMSLEY (1890) reported wild occurrence of pigeonpeas in the Shan Hills Terai of Burma. Spontaneous occurrence is not reported in India from herbarium labels or otherwise, probably due to the fairly intensive use of the land for agriculture and grazing. Only in reserved forests do pigeonpea plants have a chance to survive on their own.

3. PUTATIVE PROGENITOR OF PIGEONPEA

Atylosia cajanifolia Haines, described in 1920, is a wild species very similar to the pigeonpea, except for its large seed strophiole. The only generic character to separate *Cajanus* and *Atylosia* is the presence of a persistent seed strophiole. Nevertheless, seed strophioles are present in 144 of the 5800 pigeonpea entries available in the world collection of pigeonpea at ICRISAT Center. In March 1977 an ICRISAT expedition succeeded in finding *A. cajanifolia* on Bailadilla Hill, Bastar district, Madhya Pradesh, at 1000 m altitude and this was only the seventh documented gathering since the species was first collected. It is known from three locations in Orissa and Madhya Pradesh only. The vernacular name is 'ban arhar' which translates to 'wild pigeonpea'. This is presumably the link between *Atylosia* and *Cajanus*. Further evidence of its taxonomic state as a species separate from *C. cajan* is the existence of intergeneric crossing barriers, especially with pigeonpea as female parent. The reciprocal cross is not too difficult to obtain and in fact occurred naturally at ICRISAT Center. A plot of *A. cajanifolia* near pigeonpeas in the Botanical Garden produced hybrids through open pollination in addition to selfed seeds.

4. OCCURRENCE OF ATYLOSIA SPP. AND THEIR RELATION TO PIGEONPEA

The presence of many *Atylosia* species in India, some of which intercross with the pigeonpea, as well as the largest variation within the pigeonpea, points to an Indian origin. Northern Australia and Queensland have about ten species of *Atylosia*, most of which are endemic. *A. scarabaeoides*, which has the widest distribution of all the wild



Movement of pigeonpea from its center of diversity (prepared e.g. with data from DE, 1974, and VERNON ROYES, 1976).

species (India, Indo-China, Southeastern Asia, the Pacific Islands, Coastal Africa, and even Jamaica), is of apparent recent introduction outside Australasia. In West Africa *Cajanus kerstingii* Harms is found, but its seed strophiole makes it more properly an *Atylosia*. It looks similar to the pigeonpea but not so close as *A. cajanifolia*. *A. trinervia* (DC.) Gamble (South India) also has many similarities to pigeonpea; in 1977 'intergeneric' hybrids of *A. trinervia* with pigeonpea were obtained at ICRISAT. *A. lineata*, *A. sericea*, and *A. scarabaeoides* have earlier been successfully crossed with pigeonpea (REDDY, 1973; DE, 1974, who also reported cytological details). Remarkable homology exists between the chromosomes of *Atylosia* and *Cajanus*. All mentioned species and all other species ever studied in *Atylosia* and *Cajanus* have $2n = 22$ chromosomes. In several hybrids pairing is almost entirely normal.

In the context of the questionable nature of most reported intergeneric hybrids in *Leguminosae*, MC COMB (1975) considers the generic boundaries between *Atylosia* and *Cajanus* as misplaced. The hybrids obtained he judges to be of interspecific nature and, like most authors reporting cytology and hybridization, suggests a revision of the genera and a declaration of congenericity.

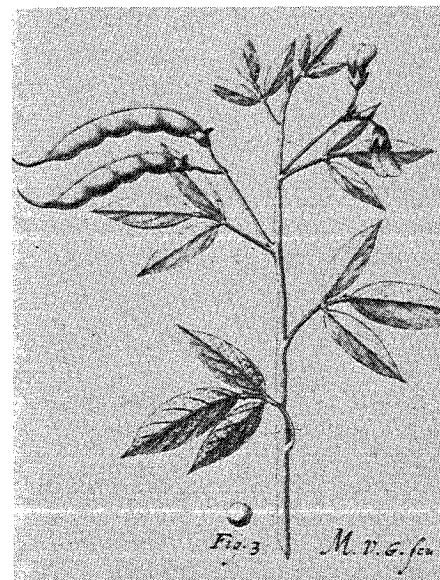
5. ARCHAEOLOGICAL REMAINS

The often repeated reference to *Cajanus* seeds in an Egyptian tomb of 2400–2200 B.C. really points to only one seed identified as such (SCHWEINFURTH, 1884). Funeral offerings in this tomb at Dra Abu Negga (Thebes) of the 12th dynasty consisted of barley, wheat, pomegranate, lentils, two broadbean seeds, and the single pigeonpea seed. This is apparently the only report of pigeonpea material found in Egyptian burial vaults and VERNON ROYES (1976) suggested reexamination of this seed. As evidence for an African origin it is very weak. Reports of archaeological remains in India became available only recently, so DE (1974) was not able to consider those. KAJALE (1974) reported an archaeological find of pigeonpea for the first time in India, at Bhokardan (Maharashtra). The seeds, of relatively small size, were found in deposits ranging in age from the 2nd century B.C. to the 3rd century A.D. From nearby Nevasa, two very small pigeonpea seeds were reported in Indo-Roman deposits dated 50 B.C. – 200 A.D. (KAJALE, 1976–1977) but these must have been some other pulse as KAJALE (1977) later states that Bhokardan yielded the only evidence available at that time.

As in Egypt, ancient remains are scarce but more are likely to be unearthed following closer scrutiny. The absence of very marked seed characteristics does not facilitate positive identification in the carbonised state.

6. LINGUISTIC EVIDENCE

DE (1974) reviewed the linguistic evidence. The earliest Indian name 'tuvari' dates from the third to fourth century A.D., but this in Sanskrit seems to have been adopted



Engraving of pigeonpea, from PLUKENET'S *Phytographia*, tab. 213, fig. 3, 1692.

Phaseolus erectus incanus siliquis torosis Kayan dictus. Cajan arbor Indica folijs Trofolij bituminosi, siliquis Orobi Breyn Prod. 1. forte Arbor trifolia Indica. IB tom. 2. Thora Paërou. Hort. Malab. P. 6. Anagyris Indica legumino sasiliquis torosis. PBP. Kajan. s. Katsjan Zeylanensibus. Lak-Goetum Chinensibus, uã Barbadensibus Nostratibus Pigeon-Pea(ie) Pisum columbarium nominatur.

from earlier Dravidian local names. The age of African names cannot be ascertained but they are certainly old. American local names were derived from the African ones and both African and European languages are involved. The name 'pigeonpea' originated in the Americas (PLUKENET, 1692; MILLER, 1754) where the seeds were reported to be more important for pigeons than for human nutrition. No earlier references to this name were available to the author. All early references to Asiatic vernaculars including 'Kayan', hence *Cajanus*, are devoid of the name pigeonpea. A complete listing of all vernacular names runs into several pages of text.

7. CONCLUSION

Floristic, linguistic and cytological evidence points to an Indian origin of the pigeonpea, from where it was most probably distributed to Africa at least two millennia B.C. Africa is definitely a center of (secondary) diversity, since we have found there some characters not present in India (ivory flower colour and true purple stems). From Africa it was imported into the Americas. Eastwards, the crop reached Indonesia from where other introductions may have been made into Madagascar. The map is adapted from the data of the authors indicated. Present-day exchanges of landrace material and

improved cultivars are taking place on a large scale between India, Africa, Latin America, and Australia. The details of taxonomy and vernacular names are under preparation by the author in a revision of the genera *Atylosia* and *Cajanus*.

8. REFERENCES

- BRUCHER, H. Tropische Nutzpflanzen. Sprenger Verl. Berlin-Heidelberg-New York: 166-167 (1977).
- CANDOLLE, A. DE. Origine des Plantes Cultivées. Paris: 266-268 (1883).
- COLLETT, H. & HEMSLEY, W. B. On a Collection of Plants from Upper Burma and the Shan States. J. Linn. Soc. Bot. 28: 48 (1890).
- DE, D. N. Pigeonpea. In: Evolutionary Studies in World Crops; Diversity and Change in the Indian Subcontinent. Ed. Sir J. Hutchinson, London & Cambridge: 79-87 (1974).
- HAINES, J. J. Plants from Bihar and Orissa. J. As. Soc. Beng. 1919 n.s. 15: 312 (1920).
- KAJALE, M. D. Plant Economy at Bhokardan. App. A in: Excavations at Bhokardan (Bhogavardhana) 1973. Nagpur University and Maharashtra Marathwada University. Eds. S. B. Dev & R. S. Gupta: 2: 7-224 (1974).
- ID. Ancient Plant Economy at Nevasa during Satavahana and Indo-Roman Periods. Bull. Deccan Coll. Res. Inst. 36-1/4: 50-58 (1976-1977).
- ID. Ancient grains from Excavations at Nevasa, Maharashtra. Geophytology 7-1: 98-107 (1977).
- LACKEY, J. A. A Synopsis of Phaseoleae. Unpubl. Thesis, Iowa State University: 28-29 (1977).
- MAESEN, L. J. G. VAN DER. Germplasm collection and Evaluation in *Cicer* and *Cajanus*. Proceedings International Workshop on Grain Legumes. January 13-16, 1975. ICRISAT, Hyderabad: 229-237 (1976).
- MC COMB, J. A. Is Intergeneric Hybridization in the Leguminosae possible? Euphytica 24: 497-502 (1975).
- MILLER, PH. Gardeners Dictionary ed. 4: Cytisus 22 (1754).
- OZA, G. M. What is the Native Home of the Pigeonpea? Indian Forester 98-8: 477-478 (1973).
- PLUKENET, L. Phytographia, Tab. 213, fig. 3 (1692).
- REDDY, L. J. Intèrrelationships of *Cajanus* and *Atylosia* species as revealed by hybridization and pachytene analysis. Unpubl. thesis, Kharagpur (1973).
- SCHWEINFURTH, G. Further Discoveries in the Flora of Ancient Egypt. Nature 29: 312-315 (1884).

ACKNOWLEDGEMENTS

The author is grateful for the comments and editing of G. D. BENGTON, J. M. GREEN, M. H. MENGESHA and W. REED. ICRISAT receives support from a variety of donors, governments, foundations, incl. IBRD, IDRC, UNDP, USAID etc. The responsibility for all aspects of this publication rests with ICRISAT.

April, 1979

ICRISAT Journal Article no. 89

MERKMALS-INTROGRESSION BEI FORSSKAOLEA (URTICACEAE)

H. MERXMÜLLER UND H. ROESSLER

Institut für Systematische Botanik der Universität, München

1. EINLEITUNG

Die Gattung *Forsskaolea* L. besitzt zwar ein ausgedehntes altweltliches Verbreitungsgebiet von den Kapverden bis Indien und Südafrika, doch ist sie in weiten Teilen dieses Areals nur mit einer oder zwei Arten vertreten. So kommt im saharo-sindischen Bereich nur *F. tenacissima*, auf den Kanarischen Inseln nur *F. angustifolia*, in der Kapprovinz nur *F. candida* vor. Im nördlichen Ostafrika treten *F. tenacissima* und *F. viridis* auf; letztere Art hat im tropischen Afrika eine weite, wenn auch nicht geschlossene Verbreitung.

Anders liegen die Verhältnisse in Südwestafrika. Sicherlich kann es sich auch hier nicht um sehr viele Arten handeln; drei bzw. vier Arten waren bisher aus dem Gebiet angegeben, davon zwei, nämlich *F. hereroensis* und *F. eenii*, aus dem Gebiet beschrieben. Jedoch erwies es sich bei der Bearbeitung der Gattung für den 'Prodrömus einer Flora von Südwestafrika' (ROESSLER 1967) als schwierig, wenn nicht unmöglich, die in den letzten Jahrzehnten erstmals in reichem Maße gesammelten Belege sinnvoll zu ordnen und zu benennen. Die Bearbeitung wurde daher in bewußt provisorischer Form publiziert.

Diese Tatsache bewog uns, die Untersuchung und Analyse des heute vorliegenden, reichen Materials im Rahmen einer Zulassungsarbeit am Institut für Systematische Botanik der Universität München durchführen zu lassen. Fräulein ISOLDE MÜLLER hat sich dieser Aufgabe angenommen. Ihre als Manuskript niedergelegten Ergebnisse bilden, in veränderter und erweiterter Form, die Grundlage für die vorliegende Arbeit.

2. BISHERIGE FASSUNG DER ARTEN

Folgende bisher beschriebenen Sippen sind für Südwestafrika (und angrenzende Gebiete) in Betracht zu ziehen:

F. candida L. fil., Suppl.: 245 (1781)

F. viridis EHRENB. ex WEBB in HOOKER, Niger Fl.: 179 (1849)

F. candida L. fil. var. *virescens* WEDD. in DC., Prodr. 16(1):235⁵⁶ (1869)

F. hereroensis SCHINZ in Bull. Herb. Boiss. 4, App. 3: 51 (1896)