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Celebrating the end of a 30 year old project, the Ethiopian Flora Project, and the beginning of a new one, the Gullele Botanic Garden

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Abstract:

The National Herbarium of Ethiopia within the Addis Ababa University held a workshop in November, 2010, to celebrate the end of the Ethiopian Flora Project and the beginning of a new Botanic Garden. Many participants of the workshop expressed that the Ethiopian Flora Project is not only a model for trans-national and inter-continental collaboration between professionals and institutions but also a model for rapid generation of needed botanical information about a country. Forty-three institutions and 92 scientists from 18 countries participated in the Project. The Ethiopian Flora Project was probably the largest departmental project of the Addis Ababa University, carried out jointly by its Department of Biology (now Faculty of Life Sciences) and the Department of Systematic Botany [now Biology] of Uppsala University in Sweden between 1980 and 2010. A brief history of the project is provided and its achievements highlighted. The entire vascular flora of the country has now been documented in eight volumes. Twelve people have been trained, directly and/or indirectly, to the level of Ph. D. and these, in turn, have trained over 200 Ethiopians and others from neighboring African countries to the level of M.Sc. The small specialized library within the National Herbarium, AAU, geared towards systematic botany, is strengthened. A large number of scholarly and scientific articles as well as a number of books have been published using the information contained in the Flora volumes and the collections in the National Herbarium. The National Herbarium (known by its acronym ETH) is now offering services to institutions within the country at a much improved pace and accuracy than hitherto due to the increased number and diversity of the collections. The Department of

Biology has also entered into an agreement with the Addis Ababa City Administration to develop a portion of the Entoto mountains into a botanic garden. The expressed purpose of the Gullele Botanic Garden is to serve the country as a model (education, study, research, environmental awareness, conservation, etc.) on how to use and preserve one of its environmental resources.

Keywords: *Flora, flora, The Ethiopian Flora Project, Workshop, National Herbarium, Gullele Botanic Garden, W. G. Schimper, Addis Ababa University, Uppsala University.*

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Introduction

The Department of Biology of Addis Ababa University, currently Faculty of Life Sciences, held a four-day workshop in November 2010 to celebrate the end of a 30-year long project and the beginning of a new one. The workshop was able to bring together many of the collaborators and contributors of the Ethiopian Flora Project as well as a number of directors of botanical gardens from Europe and Africa (Fig. 1)

Fig. 1 Partial view of participants of the workshop – directors of botanical gardens and museums from Africa, Europe and Scandinavia in front view



to offer insights on the new project: the Gullele Botanic Garden. A large number of Ethiopian scientists and also students participated in the four-day long deliberations. Below is presented a brief history of the major attempts made to document the flora of Ethiopia starting from

the nineteenth century, the rationale for the initiation of the Ethiopian Flora Project by the Addis Ababa University, the efforts made, the achievements of the project and also the background on the initiation of a new project, the Gullele Botanic Garden (Figs. 2 and 3).

Fig. 2 Gullele Botanic Garden – site under construction.



Fig. 3 Gullele Botanic Garden – partial view of the natural vegetation (mainly junipers, *Juniperus procera*).



A Flora

The word Flora, when written with an upper case ‘F’, is about a book that provides information on the plants of an area, i.e., the characteristic and distinguishing features of each species of plant, diversity and distribution of genera and families of plants and how to identify or separate them from other related families, genera and species usually employing keys, diagrams, photographs, line drawings, etc. Depending on the available expertise and resources, the Flora may be written as a comprehensive piece of work or it may be restricted in scope, i.e., it may deal with a segment of the plants found in an area. When written with a lower case ‘f’, it depicts all the plants found in an area irrespective of the nature of the species.

The Ethiopian flora

Interest in the various aspects of Ethiopian plants started a long time back in history. One of the early plants known to have crossed borders is the frankincense (*Yetan zaf*, in Amharic; *Boswellia papyrifera* (Del.) Hochst.: Wengel, 1987). It was probably taken from the eastern or northeastern parts of Ethiopia or from the broad region then known as ‘Somaliland’ to Egypt. Another

one is coffee (*Coffea arabica* L.). Coffee went first to Yemen (or Arabia Felix as the entire Arabian land was then known), then to Java and from there it spread elsewhere in the world due to the budding commercial enterprise in Europe. Like many other people of the world, the Ethiopians have been using their plants for a variety of purposes including as medicinal plants. Interest in the study of the medicinal plants of Ethiopia can be traced to the year 1698 when Poncet (1709) first visited Gonder, the seat of the ancient Ethiopian empire. The Scottish traveler, James Bruce, with his Italian artist, Luigi Balugani, in their attempts “to discover the source of the Blue Nile” collected specimens and also compiled a list of medicinal and other useful plants mostly from the northern parts of Ethiopia (Bruce, 1790).

Systematic studies on the plants of Ethiopia started, however, with the arrival of the German traveler and plant collector, Wilhelm Georg Schimper, in 1837. W. G. Schimper was employed by a German Society called the ‘Esslinger Reiseverein [The Esslinger Travel Society]’ founded by C. F. Hochstetter & E. G. Steudel (Friis,

2009) that studied and traded plants from around the world. This Society distributed the plant specimens mostly to various European botanical institutions and interested individuals with subscriptions (Hochstetter & Steudel, 1840). According to Hochstetter & Steudel (1840: 303) “the first part of Wilhelm Schimper’s Botanical Treasures from Abyssinia, viz., the plants collected in the neighbourhood of Adoa, ‘Plantae Adensis; section prima’, will herewith reach the hands of the several subscribers; ...” The “... second portion of Schimper’s Abyssinian plants for distribution; that is, Sectio prima, Pars 2da., consisting of two hundred species ... “reached Germany in 1841 (Anonymous, probably Hochstetter & Steudel 1841: 70). Currently many of the plants collected by W. G. Schimper are found in “more than 60 herbaria” (Friis, 2009) in Europe (e.g., Paris, Frankfurt, Berlin, Austria, etc.), England (London), Sweden (Uppsala, Stockholm), Denmark (Copenhagen), and the United States of America (The Smithsonian Institution, Washington DC., Missouri).

In connection with collections, then broadly known as “natural history” material, some authors also relate the political interests of the countries represented by the collectors

and how they were trying to influence policies and politics then (Friis, 2009; Mesfin, 1994; Rubenson, 1976). The following are selected instances from Rubenson (1976) regarding Schimper:

- “another early ‘settler’ was the botanist Wilhelm Schimper, who arrived in the 1830s and was deeply involved in political affairs in the 1840s.’ p. 19.
- “De Jacobis and Schimper, who had joined the Catholic church, gladly took over Coffin’s former fief of Inticho with the intention of making it a small self-governing Catholic colony.” pp. 103 - 104.
- “Schimper had no more success with a direct request to the French government in October 1844 for a few hundred muskets to be used partly as a gift to Wibe, partly to arm a small contingent under his own command.” p. 109
- “on 21 May Schimper arrived at Gwela and told R. Jacobis that Wibe wanted him to obtain ‘the protection of the King of France against the Turks.’” p. 109
- “... a first attempt by Kassa [Emperor Yohannes] to establish direct relations with the new and powerful German Empire was also made through Schimper and Mayer ...” p. 283

There is also an interesting story about W. G. Schimper. It appears that he had overstayed his assignment in Ethiopia.

Hochstetter & Steudel (1840: 305) wrote “though pleasing and highly promising as it certainly is for science, that the courageous Schimper remains so long in Abyssinia, yet his prolonged sojourn did not enter into the original idea, plan, wishes or instructions, of the directors ...” Schimper fell in love with Ethiopia so much that he stayed there until his death in 1878. He was married to “a lady from Adwa” (Desta, 1985 Eth. Cal., page 30), Weizero Mirsit (Friis, 2009) or the daughter of Dejazmatch Woube, the then governor of Begemedir and Tigray (Gillett, 1972, page 118). According to Dawit (1985, Eth. Cal.), Schimper had two children from this marriage. They were Engedashet Schimper and Kassahun Schimper. It appears that both were sent to Switzerland to study language, theology and philosophy (Dawit, 1985: 30). In addition to language, Engedashet Schimper studied medicine and technology and returned in 1871 (Eth. Cal.) through Massawa and stayed in Hamassein, Eritrea (Dawit, 1985: 32). Although the date of return of Kassahun Schimper to Ethiopia is not known, it appears that he had settled in Ethiopia around the same time. According to Dawit (1985: 30) he was the father of W/o Romanework Kassahun, probably the first female radio host in Ethiopia.

According to Friis (2009) Schimper had two daughters, “Schimper’s eldest daughter, Jeshimabet Desta, born 1844, ... and youngest daughter Tsehaitu, born in 1845 ... and one son, Engdaeschat, born 1847 ...” Friis (2009) also stated that “there is no indication in the sources that Woyzero Mirsit was a daughter of Dejazmatch Wube, ...”

Based on the plant collections made by W. G. Schimper and two young French naturalists, Antoine Petit and Richard Quartin-Dillon, the French botanist Achille Richard produced the first Flora of Ethiopia. It was called “Tentamen Florae Abyssinicae” (1847-1851) since the majority of the plants came from the northern parts of Ethiopia, a region then known as Abyssinia. Schimper’s collecting localities ranged from Ailet (near Massawa) to Mt. Guna (southern Gonder, Gillett 1972). About 1700 species were recorded in 2 volumes.

Starting around 1893, Italian naturalists and scientists collected a considerable amount of specimens from particularly Eritrea and Somalia, and, in the 1930’s, mostly from Bale, Gamo Gofa and Sidamo. Based on these and other collections deposited in major herbaria, Italian scientists started a

series called “Adumbratio Florae Aethiopicae”, published in the journal “Webbia” (Chiarugi, 1953). The herbarium in Florence (Firenze) which also has a large number of Ethiopian specimens became a center for the study of Ethiopian plants.

The next attempt to document the plants of Ethiopia, in a series called “Enumeratio Plantarum Aethiopiae Spermatophyta” and initially published as supplements in the Bulletin du Jardin Botanique National de L’Etat, Bruxelles/Bulletin du Jardin Botanique National de Belgique, but later on as a two-volume work, was by the late G. Cufodontis who produced “an annotated compilatory checklist” (Hedberg, 1983: 572). It included a list (i.e., without keys and descriptions) of the plants of the entire horn of Africa (Cufodontis, 1952 – 1972). This checklist became the primary source for the names to appear in the modern Flora of Ethiopia and Eritrea.

The late Professor de Wit, Agricultural University in Wageningen (The Netherlands), also a member of the advisory committee that was established to study the modern flora of Ethiopia (see below), who was interested in crop plants, wanted to produce a Flora focused on only the useful

plants of Ethiopia (pers. comm. with author, 1979).

Interest on writing the Flora of Ethiopia, in the twentieth century, arose as a result of the patchy and rather poor botanical explorations made hitherto in the entire country by Europeans in comparison with what was done in the rest of Africa which, by then, was well covered and Floras were being produced by the colonial powers. “The only tropical African country which, apart from a brief Italian occupation, remained independent during the colonial epoch was Ethiopia, for which consequently no flora project was initiated by a colonial power” (Hedberg, 1983: 571). As shown in Table 1, many African countries started producing modern Floras much earlier than Ethiopia, but they were unable to complete writing them. Progress has been slow due to limited resources (budget and professional), size of the flora and apparently also due to lack of cooperation and coordination between the European and African institutions involved in the projects.

The Ethiopian Flora Project – from an ‘idea’ to Reality

The ‘idea’ to produce a Flora of Ethiopia, based in an institution within Ethiopia, arose

Table 1. African Flora Projects: start and end dates, as well as estimated size of their vascular flora (Frodin, 1984, 2001). *After volume 3, the first published volume which is titled ‘Flora of Ethiopia’ all other volumes bear this name.

Name of Flora			
Based on National Boundaries	Year started	Year completed	Estimated size
<i>Conspectus Florae Angolensis</i> (Angola)	1937		5,000
<i>Flore du Cameroun</i>	1963		8,000
<i>Flore de la Cote d’Ivoire</i>	?	1984	3,720
<i>Flora of Egypt</i>	1925	1954	2,085
<i>Students’ Flora of Egypt</i> (1 st ed., 1956; 2 nd ed., 1974)	?	1974	
<i>Flora of Ethiopia and Eritrea</i> *	1980	2010	6,070
<i>Flore du Gabon</i>	1960		6,000
<i>Flora da Guine Portuguesa</i> (Guinea –Bissau)	1971		1,000
<i>Florae libycae prodromus: ou catalogue raisonne de plantes de Tripolitaine.</i>	?	1910	1,600
<i>A checklist of the Libyan Flora</i>	?	1977	1,800
<i>Flore du Maroc: analytique, descriptive et illustree</i>	?	1952-54	4,200
<i>Catalogue des plantes du Maroc (spermatophytes et pteridophytes)</i>	?	1941	
<i>Flora of Nigeria</i>	1970		4,715
<i>Flore du Rwanda</i>	?	1988	2,288
<i>Flora of Somalia</i>	1988	2006	3,200
<i>Flore analytique du Togo</i>	?	1984	2,423
<i>Flore analytique et synoptique de la Tunisie</i>	?	1954	?
<i>Flore de la Tunisie</i>	?	1981	2,200
Based on Regions covered			
<i>Flore de l’Afrique du Nord</i> (Algeria, Libya, Mali, Mauritania, Morocco, Tunisia)	1911		No data
<i>Nouvelle flore de l’Algerie et des regions desertiques meridionales</i>	?	1962-63	3,300
<i>Flore du Congo (Zaire) et du Ruanda Burundi</i>	1942		11,000
<i>Flora of Tropical East Africa</i> (Kenya, Tanzania, Uganda)	1952		12,000
<i>Flore du Sahara septentrional et central</i> (1 st ed., 1958)	?	1958	
<i>Flore du Sahara</i> (2 nd ed., 1977)	?	1977	
<i>Flora of Southern Africa</i> (South Africa, Lesotho & Swaziland)	1957	Abandoned in the 1990s	23,000
<i>Flora of West Tropical Africa</i> (Benin, Cote d’Ivoire, Gambia, Ghana, Guinea, Liberia, Nigeria, Senegal, Sierra Leone, Togo)	1927	1936 (1 st ed.)	7,072*
	1953	1972 (2 nd ed.)	
<i>Flora Zambesiaca</i> (Caprivi Strip of Namibia, Malawi, Mozambique, Zambia, Zimbabwe)	1960		8,000

in 1967. According to Hedberg (1986) it came from the “Parks and Landscape Development Authority and the Faculty of Science in Addis Ababa.” It appears that this idea was communicated to SIDA (Swedish International Development Authority) and the late Professor Olov Hedberg, a Swedish plant systematist, who was then known for his work on the high mountain flora of Kenya and Tanzania, was asked to stop over in Ethiopia while en route back home from field work (pers. comm., Nov. 2010, Inga Hedberg). O. Hedberg (1983: 572) also wrote “when I visited Ethiopia in the autumn of 1967, I was informed about this need [for an Ethiopian Flora] by representatives of several government departments and asked to help in soliciting support ...” It appears that O. Hedberg, in the ensuing years, discussed the idea with colleagues in Ethiopia and Europe.

It was at the seventh plenary meeting of AETFAT (Association pour l’Etude Taxonomique de la Flore d’Afrique Tropicale) in Munich, Germany, in 1970, that Mr. M. G. Gilbert, then director of the National Herbarium in Ethiopia, presented a report on the idea of initiating an Ethiopian Flora Project. Gilbert (1971) wrote “... the idea[s] presented here are the product of

quite a considerable amount of conversation and correspondence with several other people...” At the end of the meeting, a mini-symposium was devoted to the project and two committees were set up: a planning committee and an advisory committee (Hedberg, 1983). The planning committee, consisting of O. Hedberg (Chairman, Uppsala University, Sweden), I. Friis (Institute of Botany, University of Copenhagen, Denmark), M.G. Gilbert (Haile Selassie 1st University, Addis Ababa, Ethiopia), R. M. Polhill and G. E. Wickens (Royal Botanic Gardens, Kew, England), came up with a project plan and this was presented to the botanists that met in Geneva in 1974. Olov Hedberg was “asked to try to find ways of funding the project” but “neither the committee nor any of the European botanical institutions involved stood a good chance to raise the money required” wrote Hedberg (1983: 572).

An Ethiopian ad-hoc committee, composed of “... scientists from the Ethiopian Plant Genetic Resources Center (now Institute of Biodiversity: Tadesse Ebba - Chairman), the Institute of Agricultural Research (Zemedeworku, Seme Debella, Sue Edwards), the State Forest Development Agency (Lemma Gebre Selassie), the Alemaya University of

Agriculture (then Alemaya College of Agriculture: Taye Bezuneh, Amare Getahun), and the Faculty of Science, Haile Selassie 1st University (re-named as Addis Ababa University after 1974: Tewolde-Berhan Gebre-Egziabher, Getachew Aweke, Mesfin Tadesse, M. G. Gilbert)” was established sometime in 1973 or early 1974. This committee “was initially weak but gradually became stronger” (Hedberg, 1983: 572) and took over the leadership role in 1978 after the dissolution of the planning committee (Hedberg, 1983: 572). By 1978, the composition of the ad-hoc committee and the location of its head office had changed. Not much could be accomplished during the intervening years, these having been one of the most difficult times in Ethiopia’s political history. The project’s office was relocated to the faculty of Science of Addis Ababa University and a new committee was reconstituted “...to study the proposal [‘plan’ according to the European planning committee] and to modify it to safeguard Ethiopia’s interest and solicit its acceptance by the Ethiopian Government”. The committee came up with a revised proposal in 1979 and it was communicated to the Ethiopian Science and Technology Commission through the Addis

Ababa University for funding (Tewolde-Berhan, 1991).

Funding for the project was also sought from various other sources but it was finally obtained in 1980 from SAREC (Swedish Agency for Research Cooperation with Developing Countries) with the support of the Ethiopian Science and Technology Commission (E.S.T.C., now Ministry of Science and Technology) and the Addis Ababa University. The project established its base in the National Herbarium of the Biology Department of Addis Ababa University. To assist with its activities in the international arena, the project also established a “European secretariat based at Uppsala University, Sweden, under the general guidance of the European coordinator, Professor Olov Hedberg, and co-editor, Dr. Inga Hedberg.” (Tewolde-Berhan, 1991). Much support also came from the Botanical Institute of the University of Copenhagen, Denmark. Further information about the details on the history and organizational structure of the project may be obtained from Mesfin (1988) and Tewolde-Berhan (1991).

Objectives of the Ethiopian Flora Project

The overall objective of the Ethiopian Flora Project was to develop the National Herbarium so that it could play a major role in Ethiopia's development as regards the use of one of its natural resources. "This role is one of being the repository of information about Ethiopian plants so that an effective scientifically based utilization and conservation of the plant resources of the country may be possible". The main objectives of the Ethiopian Flora Project, at the outset, were to:

1. write up a Flora of Ethiopia within the shortest time possible, this being the principal objective of the project;
2. strengthen the National Herbarium and the related library to be used as reference centers for pharmacognosics, agriculturists, foresters, wild-life specialists, etc.; and
3. promote scientific activities in taxonomic botany, economic botany, forestry, plant ecology, plant physiology, etc.

Although not specifically built in the original written objectives, training of personnel in systematic botany and related disciplines was understood to be part of all of this exercise ('train Ethiopian taxonomic botanists' – Hedberg, 1983: 572; O.

Hedberg, 1986). This is also evident from the number of people trained directly and/or indirectly to the level of Ph. D. and/or M.Sc. and the support personnel, some of whom were sent for training in herbarium management to Kew, London, and now working in the National Herbarium and elsewhere in the country.

Achievements of the Project

The following points, which illustrate only the outwardly glaring achievements of the Project, could be augmented by many other 'cryptic works' such as databases, checklists, books, etc. that have been written so far (e.g., Ermias Dagne, Natural Database for Africa – NDA, CD Rom, Version 1.0., Dec. 2009; Fichtl & Admasu, 1994; Bekelech, 1999 Eth. Cal.) and the large number of articles published in various scholarly and scientific journals.

1. The Flora Volumes

The principal objective of the Flora Project, i.e., producing the family accounts in eight volumes, was completed in mid-2009. Table 2 provides information on the volumes published, year of publication, number of authors (with countries) that contributed to the publication of each volume and the number of species in each volume. Volume

Table 2. Published volumes of the Flora of Ethiopia and Eritrea, publication year, contributing countries, numbers of authors per volume, and number of species recorded per volume as well as total number of vascular plant species (* about 6,070 taking into account the additions to volumes 2-7 given in vol. 1). Volumes 2 and 4 have been divided into two parts due to the large size of the family accounts in each of these volumes

Author's country	v. 1 2009	v. 2(1) 2000	v. 2(2) 1995	v. 3 1989	v. 4(1) 2003	v. 4(2) 2004	v. 5 2006	v. 6 1997	v. 7 1995	v. 8 2009
Austria	–	–	–	–	1	–	1	1	–	–
Belgium	–	–	–	1	–	–	–	1	–	–
Canada	–	–	–	–	–	–	1	–	–	–
Denmark	1	2	2	3	1	1	2	–	–	1
Egypt	–	1	–	–	–	–	–	–	–	–
Eritrea	–	–	–	–	–	–	1	–	–	–
Ethiopia	2	6	3	3	2	1	4	8	–	1
Germany	–	1	–	1	2	–	2	–	–	–
Kenya	–	–	–	–	1	1	–	–	–	–
Italy	–	1	–	–	–	–	1	–	–	–
Netherlands	–	1	1	1	1	–	–	1	–	–
Norway	–	–	–	–	–	–	–	3	–	–
S. Africa	1	1	–	–	1	–	–	–	–	–
Spain	–	–	–	–	–	1	–	–	–	–
Sweden	–	4	–	3	2	1	3	–	–	3
Switzerland	–	–	–	–	–	–	–	2	–	1
U.K.	–	6	6	12	3	–	5	4	1	–
USA	–	1	–	–	–	–	–	2	–	–
Total # authors	4	24	12	24	14	5	20	22	1	6
No. species Additional spp.* Total # 6,070*	211 72	658	714	1,145	404	487	987	761	631	N/A

1 includes Fern-allies (plants related to ferns but not true ferns), Ferns and Gymnosperms (non-flowering plants). Volumes 2 to 5 include Angiosperms (=flowering plants; Dicotyledons), Volume 6 and 7 include Monocotyledons (flowering plants) with Volume 7 devoted exclusively to the grass family, and Volume 8 includes introductory information, indices and appendices. Table 3 provides details on the institutions that participated in writing the Flora and the individual scientists and support personnel (in ETH) that contributed to the volumes. Table 3 provides the names of the forty-three institutions and ninety-two scientists from 18 countries that contributed to the writing of the family accounts. Table 4 provides the list of editors, editorial board and editorial team members that worked hard to bring each volume to completion.

1. Strengthening the National Herbarium and its Library

In 1980, there were approximately 16,000 specimens in the National Herbarium. Today, the number has exceeded 80,000. Samples of plants from many areas of the participated

country are now deposited there. The library “has acquired much relevant botanical literature through purchase and as gifts, but this part of the project’s objective has not been as satisfactory as the other components.” (Anon., Flyer of ETH). The staff in the National Herbarium of Ethiopia requests the support of all scientists working in this field to provide helping hands in ameliorating the situation for the continued benefit of the budding young researchers in the country. As shown in Table 4, besides their contributions to the family accounts, many members of the National Herbarium have benefited from matters related to editing flora volumes.

Table 3. Institutions (with acronyms for herbaria in which contributors worked) and scientists that contributed to the flora volume accounts (in alphabetical order by country and by contributor). Herbaria Codes were obtained from Holmgren et al. 1990. 18 Countries, 43 institutions and 92 scientists

Country and Institution with herbarium acronym	Herbarium acronyms and contributors
Austria. (W): Herbarium, Department of Botany, Naturhistorisches Museum, Wien. (WU): Institute of Botany, University of Vienna, Vienna. Institut für Forstentomologie, Forstpathologie und Forstschutz, Universität für Bodenkultur, Wien.	W : Harald Riedl. (WU): Christian Puff. (Institut für...): J. Mattanovich.
Belgium. (BR): Jardin Botanique National de Belgique, Department des Spermatophytes et des Pteridophytes, Meise. (BRVU): Herbarium, Laboratorium voor Algemene Plantkunde en Natuurbeheer, Vrije Universiteit Brussel, Bruxelles.	BR : P. Bamps. BRVU : J. J. Symoens.
Canada. (WAT): Herbarium, Department of Biology, University of Waterloo, Ontario.	John K. Morton.
Denmark. (C): Botanical Museum and Herbarium, University of Copenhagen, Copenhagen.	Ib Friis; B. Hansen.
Egypt. (CAI): The Herbarium, Botany Department, Cairo University.	Mohamed Nabil El Hadidi.
Eritrea. Biology Department, Asmara University.	Ghebrehiwet Medhanie.
Ethiopia. (ACD): Herbarium, Alemaya University of Agriculture, Dire Dawa. Ethiopian Agricultural Research Organization (EARO), Addis Ababa. Environmental Protection Authority (EPA) , Addis Ababa. (ETH): National Herbarium, Biology Department, Addis Ababa University, Addis Ababa.	ACD & EARO : Demel Teketay. ETH : Damtew Teferra*, Ensermu Kelbessa (also**), Getachew Aweke, Melaku Wondafrash**, Mesfin Tadesse, Mirutse Giday (also **), Sebsebe Demissew (also **), Sileshi Nemomissa (also **), Solomon Kassie**, Sue Edwards, Yesuf Seid**, Yilma Tesfaye, Zemed Asfaw**. ETH & EPA : Tewolde-Berhan Gebre-Egziabher (also **). *illustrator; ** edited vernacular names in 1 to 3 volumes. Sue Edwards worked at ETH and Asmara University as an employee of the Project.
Germany. (B): Botanischer Garten und Botanisches Museum Berlin-Dahlem, Zentraleinrichtung der Freien Universität, Berlin. Department of Systematic Botany , University of Bayreuth, Bayreuth. (HBG): Institut für Allgemeine Botanik und Botanischer Garten, Universität Hamburg, Hamburg. (MSTR): Institut für Botanik der Westf. Wilhelms-Universität, Museum für Naturkunde, Münster. (STU): Herbarium, Abteilung für Botanik, Staatliches Museum für Naturkunde, Stuttgart. Institute of Integrated Natural Sciences, Dept. Biology-Botany, Universität Koblenz-Landau, Koblenz .	(B): P. Hiepko, H. W. Lack. (Dept. ... Bayreuth): Sigrid Liede. (HBG): Heidrun Hartmann, Hans-Dietrich Ihlenfeldt. Institute ... Koblenz : Eberhard Fischer, Hans Peter Hofmann. (MSTR): Focke Albers, S. Güldenbergl. STU : Oskar Sebold, Siegmund Seybold.
Kenya. Botany Department, University of Nairobi, Nairobi. Moi University, Eldoret.	Nairobi : John O. Kokwaro. Eldoret : Donald Otieno.
Italy. (FIAF): Dipartimento de Biologia Vegetale, Laboratori de Botanica Agraria e Forestale,	Paula Bizzarri.

Firenze;	
Netherlands. (L): Rijksherbarium, Leiden. (WAG): Herbarium Vadense, Wageningen Agricultural University, Wageningen.	L : W. J. J. O. de Wilde. WAG : J. J. Bos, A. J. M. Leeuwenberg, Hans C. de Wit, Ir. J. J. Breteler.
Norway. Department of Biology and Nature Conservation, Agricultural University of Norway, (O): Herbarium, Natural History Museum, Botanical Museum, Oslo.	Dept. ... K. A. Lye, Brita Stedje. O : Inger Nordal.
South Africa. (BLFU): Department of Botany and Genetics, The University of the Orange Free State, Bloemfontein. (NBG): Compton Herbarium, National Botanic Gardens of South Africa. (STEU): Botany Department, University of Stellenbosch.	BLFU . Johan Venter. NBG : J. P. Roux. STEU : Pete Vorster.
Spain. (SANT):Facultade de Farmacia, Universidad de Santiago de Compostela, Santiago de Compostela, Galicia.	Santiago Ortiz.
Sweden. (GB): Botanic Museum, University of Gothenburg, Gothenburg. (SBT): Bergius Foundation, Royal Swedish Academy of Sciences, Bergius Botanic Garden, Stockholm. (UPS) : The Department] of Systematic Botany [now Biology], Uppsala.	GB : Lars Kers; the late Bo Peterson. SBT : Bengt Jonsell, Torsten Eriksson. UPS : Eva Persson, the late Olov Hedberg, Inga Hedberg, Marie Melander, Mats Hjertson, Mattias Iwarsson, Mats Thulin, Asfaw Hunde.
Switzerland. (G): Herbarium, Conservatoire et Jardin botaniques de la Ville de Genève, Genève. (NMLU): Herbarium, Botany Department, Natur-Museum Luzern, Luzern. (ZT): Herbarium, Geobotanisches Institut, Eidgenössische Technische Hochschule Zürich, Zollikerstrasse, Zürich.	G : the late J. Mieg. NMLU : Anna Poncet. ZT : Elias Landolt.
United Kingdom. (BM): The Natural History Museum, London . (E): Royal Botanic Garden, Edinburgh, Scotland. (FHO): Forest Herbarium, Department of Plant sciences, University of Oxford, Oxford. (K): The Herbarium, Royal Botanic Garden, Kew, London. (LDS): Herbarium, School of Biology, University of Leeds, Leeds, West Yorkshire. (LIV): Herbarium, World Museum Liverpool, Liverpool.	BM : Mike Gilbert, E. Laurent, Norman K. B. Robson. (E): Brian L. Burt, Tony Miller. (FHO): Frank White, B. T. Styles. (K): Sally Bidgood, Diane Bridson, P. J. Cribb, David Goyder, Peter Green, David Hunt, Charles Jeffrey, J. M. Lock, Martin Sands, Brian Stannard, Sylvia Phillips, Roger Polhill, S. Thomas, Cliff Townsend, Bernard Verdcourt, Kaj Vollesen, Melanie Wilmot-Dear, LDS : Jennifer M. Edmonds. LIV : John Edmondson. Note: Mike Gilbert & Kaj Vollesen initially worked at Kew as employees of Project. Private address : R. D. Meikle; Chris Parker.
United States. (MO): Herbarium, Missouri Botanical Garden, St. Louis, Missouri. (ODU): Department of Biological Sciences, Old Dominion University, Norfolk, VA. (US): United States National Herbarium, Department of Botany, Smithsonian Institution, Washington, D. C.	MO : Peter Goldblatt. ODU : Lytton Musselman. US : R. B. Faden.

Table 4.

Editors (E), Editorial Board (EB) and Editorial Team (ET) members of the Ethiopian Flora Project.

Volume	Editors (E), Editorial Board (EB) and Editorial Team (ET) members
1	<u>E</u> : Inga Hedberg, Ib Friis & Eva Persson. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Sebsebe Demissew, Mesfin Tadesse, Ensermu Kelbessa, Ib Friis, Inga Hedberg, Sue Edwards.
2, part 1	<u>E</u> : Sue Edwards, Mesfin Tadesse, Sebsebe Demissew and Inga Hedberg. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Sebsebe Demissew, Mesfin Tadesse, Ensermu Kelbessa, Ib Friis, Inga Hedberg, Sue Edwards.
2, part 2	<u>E</u> : Sue Edwards, Mesfin Tadesse and Inga Hedberg. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Mesfin Tadesse, Sebsebe Demissew, Ib Friis, Inga Hedberg, Sue Edwards.
3	<u>E</u> : Inga Hedberg & Sue Edwards. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Mesfin Tadesse, Ib Friis, Inga Hedberg, Sue Edwards.
4, part 1	<u>E</u> : Inga Hedberg, Sue Edwards & Sileshi Nemomissa. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Sebsebe Demissew, Mesfin Tadesse, Ensermu Kelbessa, Ib Friis, Inga Hedberg, Sue Edwards.
4, part 2	<u>E</u> : Inga Hedberg, Ib Friis & Sue Edwards. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Sebsebe Demissew, Mesfin Tadesse, Ensermu Kelbessa, Ib Friis, Inga Hedberg, Sue Edwards. <u>ET</u> : Inga Hedberg, Olov Hedberg, Eva Persson, Ib Friis, Sebsebe Demissew, Ensermu Kelbessa, Sue Edwards, Melaku Wondafrash, Solomon Kassie.
5	<u>E</u> : Inga Hedberg, Ensermu Kelbessa, Sue Edwards, Sebsebe Demissew & Eva Persson. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Sebsebe Demissew, Mesfin Tadesse, Ensermu Kelbessa, Ib Friis, Inga Hedberg, Sue Edwards. <u>ET</u> : Inga Hedberg, Olov Hedberg, Eva Persson, Ib Friis, Sebsebe Demissew, Ensermu Kelbessa, Sue Edwards, Melaku Wondafrash, Solomon Kassie.
6	<u>E</u> : Sue Edwards, Sebsebe Demissew, Inga Hedberg. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Mesfin Tadesse, Sebsebe Demissew, Ib Friis, Inga Hedberg, Sue Edwards, Ensermu Kelbessa. <u>ET</u> : Eva Persson, Inga Hedberg, Damtew Teferra, Mirutse Giday, Sebsebe Demissew, Sue Edwards, Yilma Tesfaye.
7	<u>E</u> : Inga Hedberg & Sue Edwards. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Mesfin Tadesse, Sebsebe Demissew, Ib Friis, Inga Hedberg, Sue Edwards.
8	<u>E</u> : Inga Hedberg, Ib Friis & Eva Persson. <u>EB</u> : Tewolde-Berhan Gebre-Egziabher, Olov Hedberg, Sebsebe Demissew, Mesfin Tadesse, Ensermu Kelbessa, Ib Friis, Inga Hedberg, Sue Edwards.

2. Promoting Scientific Activities

A. Training

Over 12 people have been trained to the level of Ph. D., either directly or indirectly through the Project. Many of these trained personnel are associated with the National Herbarium. Others have been drawn from institutions like the Ministry of Health, Institute of Biodiversity, Wildlife Organization, and the Alemaya University of Agriculture. The National Herbarium has "... a corps of well-trained botanists and support personnel to sustain continued research and publication on various aspects of botany" (Anon., Flyer of ETH). Over 200 students have been trained to the level of M.Sc. in botanical sciences with many of the graduates now working in regional campuses of AAU and other universities in Ethiopia (Ensermu, 2003, Eth. Cal.).

B. Plant Identification Services

The National Herbarium provides plant identification services to development oriented organizations, societies and to researchers. One of the principal beneficiaries is the Ministry of Agriculture. Many departments within this Ministry, particularly those in "crop protection, bee keeping, woody biomass and livestock

development and research" utilize these services quite often (Anon., Flyer of ETH). The staff also provides consultancy services to institutions.

C. Imaging and databasing specimens

"The National Herbarium has developed a medicinal plants database through its affiliated project titled 'The Conservation and Sustainable Utilization of Medicinal Plants'. Over 1000 species of medicinal plants and associated traditional knowledge have been documented so far" (Anon., Flyer of ETH). Its' close working relationship with major herbaria in Africa, Europe and America has "... resulted in the joint development of a project titled African Plants Initiative" which has enabled the National Herbarium to image and 'digitize the type specimens' kept there and also 'invasive species' (Anon., Flyer of ETH, see also <http://plants.jstor.org>). Type specimens are samples of plants upon which the description or diagnoses of a species are based and, as such, their preservation is crucial. Losing a type specimen is just like losing a key to ones home, cabinet or locker. With regards to type specimens as well as the national and international importance of an Ethiopian Flora, O. Hedberg (1983: 572) wrote, "... a Flora of Ethiopia is badly needed, because so many East African plants were described from Ethiopian material. As long as the variation of the Ethiopian **type population** [emphasis added] is unknown, the taxonomy of such a group is often difficult to unravel."

The Gullele Botanic Garden

Although there were many attempts by the Department of Biology of Addis Ababa University to secure a spot within Addis Ababa for the establishment of a botanic garden in the 1970's and 1980's, Ethiopia did not have one until about 2005. Botanic gardens are places which maintain live collections of plants. Depending on objectives and resources, they may be large or small, restricted or worldwide in scope, open and freely accessible to the public and/or fee or subscription-based. Among the many values of establishing a botanic garden, the most important one is the awareness that it creates on environmental issues and the educational value that it will bring about to all sectors of the society. The Addis Ababa University and the Addis Ababa City Administration signed a memorandum of understanding in April 2005 to jointly develop and manage an area in the north-west of Addis including portions of the Entoto mountains called Gullele, hence it was called the Gullele Botanic Garden (Figs. 2 and 3). It "was officially inaugurated on 6th October 2005 and it is currently being developed" (Anon., Flyer of ETH). This joint effort is currently trying to gain experience from the developed world (Fig. 1).

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