

Gunnar Seidenfaden and his heritage: developments in the diversity and organization of Thai orchid studies

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ABSTRACT. Modern Thai orchidology was initiated by Seidenfaden & Smitinand's *The Orchids of Thailand: a Preliminary List* (1959–1965). Until the end of his career, Seidenfaden maintained a leading position with regard to taxonomic research in the orchids of Thailand (although from 1992 he became more focused on neighbouring regions), and contributions from other orchidologists were sparse. Despite Seidenfaden's eventually decreasing number of publications on Thai orchids, no less than 50 appeared in 1998–2007 compared to 24 in 1988–1997. Correspondingly, 49 authors contributed in 1998–2007 compared to 21 in 1988–1997, and the share of Thai authors increased from 24 % to 46 %. At present, at least four PhD students, 11 MSc students and 42 professional or retired biologists in Thailand are doing research on Thai orchids. The number of publication categories has gradually grown from four in 1958–1967 to nine in 1997–2008, and also the publication activity among non-professionals has increased considerably. The recent developments challenge our ability to organize ongoing Thai orchid research as team work. Establishment of a research group to prepare the Flora of Thailand account, planned online access to the Seidenfaden Database and establishment of the Native Thai Orchid Network are examples of initiatives that serve to promote data-sharing, collaboration and creation of interdisciplinary synergy.

KEY WORDS: Data-sharing, Flora of Thailand, Gunnar Seidenfaden, networking, Orchidaceae

INTRODUCTION

The renowned orchidologist and former Danish ambassador to Thailand, Gunnar Seidenfaden (Figs 1–2), would have celebrated his 100th birthday in 2008. Therefore, the 14th Flora of Thailand Meeting was considered a suitable place to examine his scientific heritage – and to evaluate the current situation and future prospects of Thai orchid studies.

Orchids have been cultivated and studied for centuries – for historical surveys, see Withner (1959) and Reinikka (1995). Indeed, orchids were already mentioned in Chinese poetry more than 2,500 years ago (cf. Weigand, 1970). In the Western World, however, tropical orchids from Asia were not described until the second half of the 17th century. During the 19th century, cultivation became an increasingly popular activity among rich people in most countries of north-western Europe. The great popularity of orchids was the direct cause of, firstly, a strong demand for increasingly bigger importations and, secondly, a need for intense scientific research in the orchid family. Thus, the horticultural interest in tropical orchids led directly to exploration and exploitation of the orchid flora in tropical

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colonies in the Old as well as the New World. By the year 1900 the orchid floras of most countries in Southeast Asia had been more or less thoroughly treated, either in separate books or incorporated in national floras. However, since Thailand was never a colony, this country did not have the same point of contact with the commercial and scientific orchid interest (or rather, obsession) that was growing out of the European horticultural circles. Early indigenous literature on cultivation of orchids in Thailand is limited to HRH Prince Nakhonsawanvorapinit's *Textbook on Orchid Cultivation* (Nakhonsawanvorapinit, 1917).

Serious exploration of the orchid flora of Thailand did not start until the mid-1950s. At that time, Seidenfaden and the late Tem Smitinand commenced a fruitful collaboration that led to the first modern account of the Thai orchid flora. However, this was only the beginning for Seidenfaden, who subsequently produced another updated revision of all the orchid genera in Thailand – in conjunction with his revisions of the orchid floras in former Indochina (Seidenfaden, 1992), Peninsular Malaysia and Singapore (Seidenfaden & Wood, 1992) and certain parts of India (Seidenfaden & Arora, 1982; Seidenfaden, 1983, 1999).

When Seidenfaden died on 9th February 2001, we lost not only the world's leading authority on the orchids of the Southeast Asian mainland, but also a former high profile diplomat and one of the last pioneering explorers of the Arctic. Some of the obituaries (e.g., Friis, 2002) include comprehensive information on Seidenfaden's varied career. In this paper we deal exclusively with Seidenfaden's contributions to the study of the orchid flora of Thailand, with chronological trends in Thai orchid studies in general and with future prospects for this area of research.

SEIDENFADEN'S SCIENTIFIC HERITAGE

Seidenfaden left us with two complete revisions of the Thai orchid flora (published around 1960 and 1980, respectively); 31 additional papers on the orchid flora of Thailand; the largest scientific collection of living Thai orchids outside Thailand; the world's largest spirit collection of Thai orchids; more than 7,000 colour slides of orchids, mainly from Thailand; more than 3,000 line drawings of orchids, mainly from Thailand, and a work file containing thousands of sketches and notes etc., mainly concerned with Thai orchids. The background to this impressive heritage is presented below.

Seidenfaden's publications on Thai orchids

When Seidenfaden first travelled to Thailand in 1934 to visit his uncle, the ethnologist and archaeologist Major Erik Seidenfaden (Sterll & Rasmussen, 1988; Friis, 2002), very little information was available on the Thai orchid flora. Among the few publications, mention should be made of *Descriptiones Epidendrorum* (König, 1791 – see also Seidenfaden, 1995a; Hansen, 1998), based on orchid collections from Thailand and Peninsular Malaysia, and Kränzlin's (1901) treatment of the sparse orchid material collected during the Danish expedition to Ko Chang in 1900. Since Williams (1904–1905) published his *Liste des Plantes Connues du Siam*, which included just over 100 orchid species, nobody had tried to compile a list of Thai orchids.

Several orchid collections had been made during the previous few decades, although the collection activity had resulted in remarkably few publications. By far the largest of the orchid collections was that of Arthur Francis George Kerr, an Irish medical doctor who worked in Thailand from 1902–1932, originally as a medical officer in Chiang Mai and later as Government Botanist. Kerr collected more than 21,000 plants in Thailand, including 1,525 orchid specimens (Jacobs, 1962).

During his first short trip to Thailand, Seidenfaden collected his first tropical orchids. It was not, however, until he returned to Bangkok in 1955 that his exploration of the Thai orchid flora became serious (Sterll & Rasmussen, 1988; Bertelsen & Flyrholm, 1997; Friis, 2002). From 1956–1982, Seidenfaden organized more than 20 expeditions in collaboration with the Royal Forest Department. Especially during his time as Danish ambassador in Bangkok, from 1955–1959, he collaborated closely with Tem Smitinand, and by the end of this period they published their jointly authored *The Orchids of Thailand: a Preliminary List* (Seidenfaden & Smitinand, 1958–1964). This book in four parts and with a total of almost 900 pages provided identification keys, illustrations, synonymies, distribution accounts and taxonomic discussion for 771 Thai orchid species. Only 11 new species were described in the book, but 87 species were added as unidentified, and many of these have since been described as new species. It is no exaggeration to say that this book changed the orchid flora of Thailand overnight from one of the least known to one of the best known orchid floras in tropical Asia.

In 1969 Seidenfaden initiated a series of papers called *Contributions to the Orchid Flora of Thailand*. Thirteen instalments appeared before his death (Seidenfaden, 1969–1977, 1981–1985, 1995b, 1997), and the unfinished manuscript for number 14 was completed by H. Æ. Pedersen and published in 2003 (Seidenfaden & Pedersen, 2003). These papers, consisting of nearly 600 pages, contain a mixed assemblage of information, mainly serving to update the taxonomy, nomenclature and distribution data of his previous revisions and to present new taxa from Thailand and neighbouring countries. In addition to many new combinations and new records for Thailand, 61 new species are proposed. Furthermore, this series also contains the descriptions of three new genera: *Didymoplexiopsis* Seidenf., *Thaia* Seidenf. and *Rhynchogyna* Seidenf. & Garay.

During the same period, Seidenfaden started to revise the original *The Orchids of Thailand* (Seidenfaden & Smitinand, 1958–1964) genus by genus, and he considered it useful to publish his observations and notes as the work with each genus moved along. This work led to publication of the series *Orchid Genera in Thailand* (Seidenfaden, 1975–1980, 1982–1988), consisting of more than 2,500 pages. In addition to a large number of new combinations and new records for Thailand, the 14 instalments also contain the description of a new genus, *Lesliea* Seidenf., as well as descriptions for more than 100 new species. The only genera of Thai orchids that are not treated in *Orchid Genera in Thailand* series are a few for which revisions had already been published in the *Contributions to the Orchid Flora of Thailand* or in separate papers.

Finally, Seidenfaden published 17 separate papers on Thai orchids that were not included in his two major series (Seidenfaden, 1965, 1968, 1969, 1971, 1973, 1977a, 1977b, 1980, 1984, 1986, 1987, 1994a, 1994b, 1995a, 1996a, 1996b; Anker & Seidenfaden, 2001).

Seidenfaden's orchid collections

As emphasized by de Vogel *et al.* (1999), living collections are extremely important for taxonomic research on orchids. During expeditions in the field, normally less than 20 % of the species are found in flower – but if live specimens are brought into cultivation, they can be identified and important parts can be preserved when they subsequently flower. Even undescribed species regularly turn up in this way, and experimental studies are virtually impossible without an adequate collection of living material. The importance of scientific collections of live orchids for research was already realized by Seidenfaden in the 1950s. Based on his many expeditions, he established one of the world's largest living collections of Thai orchids (Pedersen, 2004). Today, this collection is accommodated in a modern and roomy greenhouse at the Botanical Garden in Copenhagen.

Seidenfaden gradually built a comprehensive spirit collection of orchids, mostly from Thailand (Pedersen, 2004), largely through sampling his living collection. When the collection was moved from Seidenfaden's estate to the Botanical Museum in Copenhagen in 2001 more than 11,000 jars were counted. As a supplement to the spirit material, Seidenfaden made sure that orchids flowering in the living collection were photographed on a routine basis. Many photographers contributed to the collection of 7,198 colour slides although Gösta Kjellsson, in particular, provided a large number of close-up photos of outstanding quality.

Seidenfaden's recipe for taxonomic research

Much of the spirit material was carefully dissected and sketched by Seidenfaden himself and his observations from this activity were thoroughly utilized for delimiting taxa and preparing dichotomous keys. The scientific core of Seidenfaden's study was 82 small drawers with numerous working files – including his own pencil sketches and notes as well as drawings and descriptions received from contacts abroad (Pedersen, 2004).

Some of Seidenfaden's sketches were later inked in by professional artists and published in his revisions, frequently supplemented with colour photos. Indeed, Seidenfaden only prepared descriptions when proposing new taxa. Otherwise, he always relied entirely on good illustrations and copious keys. The 3,300 original line drawings, mainly depicting Thai orchids, are now kept at the Botanical Museum in Copenhagen.

Seidenfaden always emphasized that a very important basis for his work had been a continuous collaboration with, for example, the Flora of Thailand project, the Royal Forest Department and a number of individual Thai botanists and orchid nurserymen. Nevertheless, few of Seidenfaden's publications carry the name of a co-author. He lived at a time with comparatively low levels of communication and with individual specialization and expertise being the rule rather than the exception in botanical science. Seidenfaden was the expert on Thai orchids, everything concerned with this topic revolved around him, and very few others contributed with publications.

A resource for the future

In conclusion, Seidenfaden's pioneering work has left us with a fundamentally well-known orchid flora in Thailand. His orchid material, particularly his spirit collection and working file, still represent an immensely important and useful source of data for

taxonomic, morphological and biogeographic research. Similarly, Seidenfaden's original illustrations still depict an almost complete set of Thai orchids, and they will continue to be useful for illustrating scientific papers and books. Thus, Seidenfaden's publications, collections, notes and illustrations constitute an indispensable resource that permits orchidologists to follow in his footsteps.

DEVELOPMENTS IN THAI ORCHID STUDIES 1958–2008

Having introduced Seidenfaden and his scientific heritage, it is appropriate to proceed with some reflections on general developments in the diversity and organization of Thai orchid studies. We have decided to focus this review on the last five decades, as the level of activity was very low prior to that period. The complete list of references underlying Table 1 and Figs 3–4 can be obtained from the authors on request. Only publications dealing exclusively (or to a very wide extent) with orchids in Thailand have been considered.

Numbers of publications and authors 1958–2007

Until the end of his career, Seidenfaden maintained a leading position with regard to taxonomic research in the orchids of Thailand, although from 1992 he became more focused on neighbouring regions. Despite Seidenfaden's eventually decreasing number of publications on Thai orchids, no less than 50 publications in this field appeared from 1998–2007, compared to 24 from 1988–1997 (Fig. 3). This demonstrates an increasing publication rate and, hence, an increasing challenge to keep track of the latest scientific developments.

Also the number of contributing authors has increased considerably. Whereas only 21 authors published on Thai orchids from 1988–1997, no less than 39 did so from 1998–2007 (Fig. 4). This is an 86 % increase, and again it increases the challenge to current researchers to keep track of the latest developments. Furthermore, it is interesting that the share of Thai authors increased from 24 % in the period 1988–1997 to 46 % in the period 1998–2007 (Fig. 4). Thus it appears that the need for an efficient network is particularly strong within Thailand.

Diversity of topics 1958–2007

Compared with Seidenfaden's strictly taxonomic accounts, the diversity of topics in Thai orchid research has markedly increased in recent years; indeed, topics other than taxonomy constituted only c. 40 % of the total number of publications from 1958–1987, but more than 70 % from 1988–2007 (Table 1). Furthermore, the number of different publication categories has increased almost consistently for each decade. Thus, the scientific range of Thai orchid studies is widening and challenges our ability to keep track of the latest scientific developments. The latest addition has been publications on ex-situ conservation, which did not appear until the period 1998–2007. Also of interest is the development in publication of popular field guides. The first two appeared in the period 1978–1987, another three followed from 1988–1997 and six more were added from 1998–2007, making field guides the third most frequent publication category in the

latter decade (Table 1). This undoubtedly reflects a relatively new and growing public interest for studying Thai orchids in their natural environment.

The number of professional Thai orchidologists in 2008

The period from 1958–2007 is now history. Therefore, it might be useful also to examine the current level and structure of orchid research within Thailand. An enquiry distributed mainly through the Native Thai Orchid Network (see below) has shown that, at present, the number of Thai orchid researchers affiliated to scientific institutions in Thailand includes at least: 4 PhD students, 11 MSc students and 42 professional or retired biologists. Thus, at least 57 people in Thailand are currently conducting research on Thai orchids. This figure should be compared to the 18 Thai authors who published on Thai orchids from 1998–2007 (Fig. 3). Indeed, it seems that the number of Thais conducting research on the orchids of Thailand is growing almost exponentially.

It should be remembered that our survey only covers people affiliated to scientific institutions. Although we have not been able to provide statistics on amateur orchidologists in Thailand, it is evident that this group is also growing rapidly. Publications from amateurs are even more difficult to keep track of, because they tend to appear in local natural history magazines, and sometimes announcements of new national records, for example, have to be traced on the internet.

Table 1. Development in the relative frequencies (%) of publication categories in Thai orchidology 1958–2007.

	1958–67	1968–77	1978–87	1988–97	1998–07
Taxonomy	57	62	58	29	28
Localities and itineraries	14	8	8	13	22
Species portraits	14	8	4	13	8
Collections and history of exploration	14	4	-	4	4
Distribution and occurrence	-	12	4	17	8
Ecology, including reproductive biology	-	4	8	8	8
Coffe table books	-	4	8	4	4
Field guides	-	-	8	13	12
Ex situ conservation	-	-	-	-	6

THE FUTURE

The continuously growing diversity of Thai orchid studies in recent years, both with regard to the number of topics, the number of authors and the number of publications, has evidently created an entirely new – and in some ways difficult – situation. Fortunately, we have a larger body of researchers dealing with Thai orchids than ever before, and, as we see it, one major challenge is to create the necessary contact and collaboration between the many different researchers. Another challenge must be to facilitate broad and easy access to Seidenfaden’s collections and illustrations. Obviously, Seidenfaden’s collections are

not the only important resource for current and future Thai orchid studies, but they are very important indeed, and we hope that other institutions with important material of Thai orchids will be inspired to further facilitate access to their collections, too. We would like to conclude this paper by briefly mentioning three current initiatives that represent various ways of strengthening collaboration or facilitating access to Seidenfaden's material.

The Flora of Thailand orchid research group

In 2002 H. Æ. Pedersen was invited to coordinate the treatment of the orchid family for Flora of Thailand. To accomplish this task he established an international group of researchers that is still growing and currently comprises 12 people from five countries. This should ensure that all parts of the orchid flora will be revised by competent people. For example, Phillip Cribb from Kew has written up *Paphiopedilum* Pfitzer and Jaap Vermeulen from Leiden is the first author of the account on *Bulbophyllum* Thouars. Inevitably, leading specialists are not available for all groups. Whenever an expert is not at hand, relatively small groups are assigned to skilled all-round orchidologists who are ready and able to rapidly specialize in a narrow field. For example, Somran Suddee from BKF willingly took on the complex task of revising the small subfamily Vanilloideae. Incidentally, the first instalment of the orchid account is now being edited.

The Seidenfaden Database

When Seidenfaden passed away he left all of his spirit samples, original illustrations and working file to the Botanical Museum in Copenhagen together with a generous amount of money for the reorganization and future utilization of the material (Pedersen, 2004). Already in 2002 a database was designed for Seidenfaden's material, and the registration of spirit samples, colour slides and line drawings was completed during the following years. Most recently, the basic preparation of this electronic resource was completed by scanning all of the line drawings and colour slides.

It is our plan to make the Seidenfaden Database searchable on the internet very soon. This will enable everybody working on Thai orchids to obtain original information on Seidenfaden's collections online – and to check for the existence of line drawings and colour slides depicting specific taxa and specimens. Copyright agreements already exist that make the line drawings and colour slides available for scientific publications on very favourable terms, and hopefully these agreements can be extended in the not too distant future to make the illustrations viewable online through the Seidenfaden Database.

The Native Thai Orchid Network

Obchant Thaithong (BCU) and H. Æ. Pedersen established the Native Thai Orchid Network in 2004. Until recently, the main purpose of this informal association of orchidologists was to ensure that all important new finds of orchids were taken into consideration for the Flora account. However, during a workshop hosted by Queen Sirikit Botanic Garden on 3 Nov. 2008 (Fig. 5), it was decided to widen the scope of interaction considerably under the unifying theme of conservation. Indeed, it is now the intention that the Native Thai Orchid Network, as a minimum, should be used to

coordinate orchid conservation-related activities and to facilitate planning of new projects, ensuring complementarity and synergy rather than redundancy. Furthermore, it is hoped that the network will also be developed into a forum that creates and promotes actual collaboration, even across the borders between different fields of research. At the time of writing, 85 people affiliated to scientific institutions, primarily in Thailand, are members of the Native Thai Orchid Network.

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Figure 1. Gunnar Seidenfaden in his study discussing orchid growth forms and architecture with Hanne N. Rasmussen, 17th Feb. 1979. The papers in the foreground are the proofs of Orchid Genera in Thailand VIII. *Bulbophyllum* Thou. Photograph by Finn N. Rasmussen.



Figure 2. Gunnar Seidenfaden examining a plant of *Holcoglossum amesianum* (Rchb.f.) Christenson, 1988. Photograph by Henrik Nielsen for the faculty journal Hovedområdet.

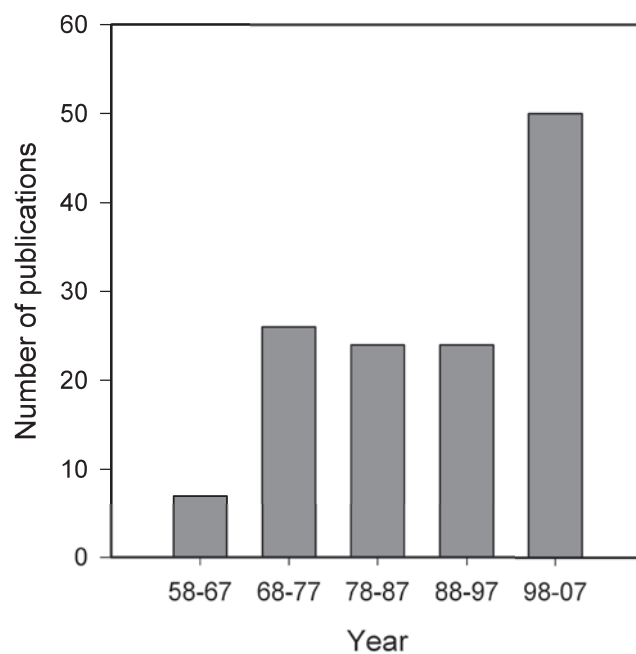


Figure 3. Chronological development in the number of publications on Thai orchids 1958–2007.

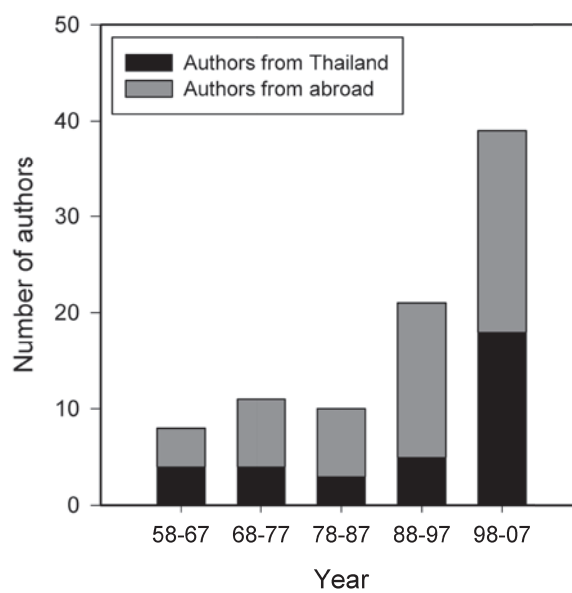


Figure 4. Chronological development in the number of authors publishing on Thai orchids 1958–2007 (i.e. the authors of the publications underlying Fig. 3).



Figure 5. Snapshot from the workshop “Activating the Native Thai Orchid Network”, Queen Sirikit Botanic Garden, 3rd November 2008. Photograph by Surawat Kongtrakul.