

THE BHUTANESE ITINERARIES OF WILLIAM GRIFFITH AND R. E. COOPER

D. G. LONG

ABSTRACT. The contributions made by William Griffith and R. E. Cooper to studies of the flora of Bhutan are outlined, together with itineraries, maps and gazetteers of all their known collecting localities.

The history of botanical exploration in the Eastern Himalayas has been described by Taylor (1975) from the time of Griffith's visit to Bhutan in 1838 to the present day. It is well known that the largest and most important collections of living and dried plants ever made in Bhutan were those of Ludlow, Sherriff and their co-collectors on 6 separate expeditions between 1933 and 1949. Their itineraries and collecting localities are adequately documented by Fletcher (1975) and Stearn (1976). The earlier collections of Griffith, in 1838, and Cooper, in 1914 and 1915, although comprising far fewer specimens, and those often of poorer quality than Ludlow and Sherriff's, are nevertheless of considerable importance as they contain both many type specimens and new records of plants from Bhutan. The collecting localities and itineraries of Griffith and Cooper have never been fully documented.

GRIFFITH

William Griffith (1810-1845) is a figure of considerable importance in the history of Indian Botany, and although his botanical career in India lasted only 13 years, he achieved an enormous amount in that time (Lang 1913). He travelled extensively and contributed much to knowledge of the floras of Burma, Khasia, upper Assam, Bhutan and Afghanistan (Anon. 1845, Coats 1969, Lamond 1970). Griffith himself planned to write a Flora of India (Anon. 1845) and to this end he compiled exhaustive notes and detailed sketches of the living plants he encountered on his travels. These notes and drawings of both phanerogams and cryptogams were published posthumously by John McClelland (see Anon. 1848) as two volumes of *Notulae* (Griffith 1847-54a) with accompanying *Icones* (Griffith 1847-54b) as were his Journals and Itinerary Notes (Griffith 1847, 1848).

Griffith was the first botanist to visit Bhutan, travelling as a member of a diplomatic mission (with armed escort) led by R. B. Pemberton, the objective being to secure a settlement of frontier disputes between Bhutan and British India (Karan 1967). They traversed the country from Dewangiri in the east, northwards to Tashigang, westwards to Punakha then left the country at Buxa in the south-west (Griffith 1840, 1847). The expedition lasted for four and a half months, during which Griffith collected about 1200 specimens of vascular plants, many of them new to science. Amongst the more interesting species described from these collections were *Acanthus carduaceus* Griff. (688)*, *Corylopsis himalayana* Griff. (593), *Ceratostigma*

* Griffith numbers cited are 'Itinerary numbers' as listed in Griffith (1848).

griffithii Clarke (1007), *Salvia plectranthoides* Griff. (845), *Primula bracteosa* Craib (582), *Rhododendron griffithianum* Wight (1045), *R. grande* Wight (618) and the conifers, *Abies densa* Griff. (662), *Larix griffithiana* Carr. (1010) and *Picea spinulosa* (Griff.) Henry (694). Many other new species were discovered by him but remained unpublished until they were later collected elsewhere and described by others: e.g. the *Rhododendron* species, *R. cinnabarinum* (1072), *R. dalhousiae* (138), *R. edgworthii* (770), *R. falconeri* (654), *R. glaucum* (691), *R. niveum* (947), *R. triflorum* (1046) and *R. virgatum* (776) were all collected by Griffith in Bhutan in 1838 but were first described by J. D. Hooker (1849–51) from collections made by himself in Sikkim in 1848–49. Although all of his localities have been revisited by later botanists, many of the species Griffith found have never been recollected in Bhutan: e.g. *Aquilaria malaccensis* Lam. (126), *Embelia ribes* Burm. (416), *Eurya trichocarpa* Korth. (104), *Ficus rumphii* Bl. (145), *F. sarmentosa* J.E.Sm. (594), *F. virens* Ait. (33), *Gordonia excelsa* Bl. (134), *Leptoboaea multiflora* (Clarke) Gamble (100), *Lindera bootanica* Meissn. (919a), *Litsea glutinosa* (Lour.) C.B.Rob. (483), *Persea bootanica* (Meissn.) Kosterm. (1117), *Toona sureni* (Bl.) Merr. (1174) and *Xantolis hookeri* (Clarke) van Royen (127).

It is primarily from Griffith's posthumous publications, mentioned above, that the following outline of his itinerary in Bhutan has been compiled. Because of inadequate labelling, only very limited information is available from his herbarium specimens (which are preserved in K, BM, CAL and several other herbaria, see Lamond 1970). As with his Afghanistan plants (Lamond 1970) three sets of numbers were used; correlation of which requires detailed treatment elsewhere. However, one of these sets, 'Itinerary numbers' is especially important as their presence on a specimen (as on many in K) enables one to apply Griffith's published field notes (often giving very useful descriptive observations and details of habitat, locality, altitude etc.) to a particular specimen. Localization of the published collecting localities is essential, particularly in tracing type localities of new species he discovered. Although most of Griffith's spellings differ from the modern equivalents, and frequent orthographic variants of his own names occur, it has been possible to equate most of them with place-names on the recent map of Karan (1967). Some of the localities have previously been listed by Stearn (1976). It is noteworthy that in 1838 Bhutan extended considerably farther south than it does now, including the Assam and Bengal Duars, which became part of India in 1841 and 1865 respectively (Karan 1967). Hence some of the localities (e.g. Buxa) were, in 1838, part of Bhutan but are now in India.

ITINERARY, 1838 (fig. 1)

Spellings of place-names and altitudes (in feet) are those given in Griffith's posthumous publications. For Griffith's spelling variants, modern spellings and coordinates see gazetteer.

- | | |
|--|--|
| 3 i: entered Bhutan (present-day frontier) following Durunga river to Dewangeri. | 23 i: along Deo nuddee to Rydang (2400'). |
| 4–22 i: Dewangeri (2100'); also visiting Deo Panee and Dairang. | 24 i: N to Khegumpa (5400'). |
| | 25 i: crossed Chilluree nuddee (1900'); crossed Dimree nuddee, N to Sasee. |

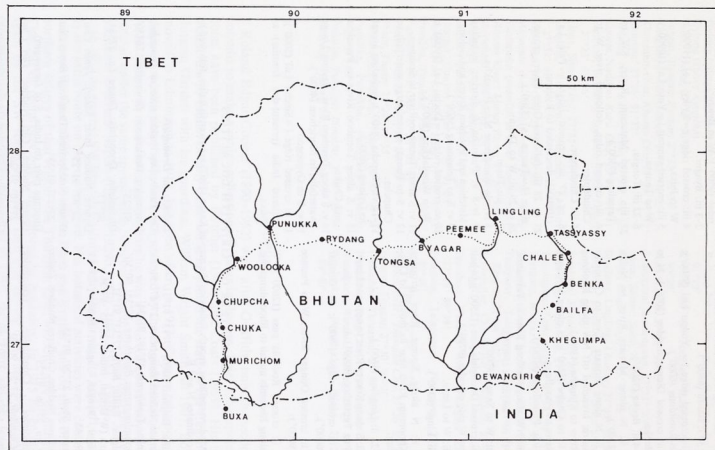


FIG. 1. Itinerary of William Griffith in Bhutan, January to May 1838. Route marked by dotted line; localities as spelled by Griffith.

- 26-27 i: Sasee (4100').
- 28 i: NE along Giri nuddee to Bailfa.
- 29-30 i: Bailfa (6800').
- 31 i: crossed ridge [= Yonpu La] (9500'); to Roondong (6000').
- 1 ii: crossed Dimree nuddee (3000'); N to Benka.
- 2-4 ii: Benka (3200').
- 5 ii: N along Monass River to Nulka (2200').
- 6 ii: N along Monass River to Ghoomkhurra; branched off NW along Koollong River to Khumna (4300').
- 7 ii: to Chalee (5200'); N along Koollong River to Phoollong.
- 8-9 ii: Phoollong (6000').
- 10 ii: NW along Koollong River to Tassyassee.
- 11-13 ii: Tassyassee (5400').
- 14 ii: W to Sanah (8000').
- 15 ii: crossed Doonglala pass (12500'); to halt on W side of ridge (9700').
- 16 ii: W to Linge.
- 17 ii: Linge (6300').
- 18 ii: N along Kooree River (crossing Khoomum River near its mouth) to Lingling.
- 19-22 ii: Lingling (4600').
- 23 ii: S along Kooree River to opposite Linge; S to Tumashoo (5000').
- 24 ii: crossed ridge (7800'); to Oongar (6000').
- 25 ii: crossed Oongar River, W to Peemee (9000').
- 26 ii: crossed Rodoola pass (12600'); W along Bhoomla nullah to Bhoomlungtung.
- 27-28 ii: Bhoomlungtung (8600').
- 1 iii: SW along Tungchien River; crossed ridge (9500'); W to Byagur.
- 2-3 iii: Byagur.
- 4 iii: crossed ridge [= Kyikyi La] (11000'); W to Jaia.
- 5 iii: crossed summit [= Yuto La] (10900'); W to Tongsa.
- 6-22 iii: Tongsa.
- 23 iii: crossed Mateesun River, SW to Taseeling (7300').
- 24 iii: crossed ridge, followed river W to Chindupjee.
- 25 iii: Chindupjee.
- 26 or 27 iii: crossed ridge [= Pele La] (10800'); descended to Rydang.
- 27 or 28 iii: followed Gnee River; crossed ridge [= Tsarza La] (8300').
- 28 or 29 iii: W to Thain.
- 29-31 iii: Thain.
- 1 iv: via Wandipore N to Punukha.
- 2 iv-8 v: Punukha & district; including Matchien and Patchien Rivers and Gylong;
- 9 v: S to Telagoung (5600').
- 10 v: crossed ridge [= Dochu La] (10000'); W to Woollakkoo (8000').
- 11 v: S along Teemboo River to Somnoo.
- 12 v: S to Panga; passed large waterfall; to Chupcha.
- 13-14 v: Chupcha (8100'); including ascent to Gylong (9800').
- 15 v: S along Teemboo River to Punukha and Chuka.
- 16 v: S along Teemboo River, passing 2 large waterfalls; to Murichom (4000').
- 17 v: S to Gygoogoo.
- 18 v: crossed ridge [= Sinchu La] (5000'); entered India (present-day frontier) at Buxa.

GAZETTEER OF GRIFFITH LOCALITIES

Modern spellings, mostly following the map of Karan (1967) are given in *italics*, followed by co-ordinates N and E.

Bailfa, Bulphai: *Balfi*, 27°13' 91°31'

Bamree Nuddee: *Bamri Chu*, 27°17' 91°33'

Benka: *Tashigang*, 27°19' 91°34'

Bhoomlungtung: *Bumthang*, 27°35' 90°50'

Bulphai, Bailfa: *Balfi*, 27°13' 91°31'

Buxa (W Bengal, India): 26°45' 89°36'

Byagar, Byogar, Juggur: *Byakar*, 27°33' 90°43'

Chalee: *Shali*, 27°29' 91°35'

Chilluree Nuddee, Chulleree Nuddee: *Tsalari Chu*, 27°06' 91°25'

Chindupjee, Chindupjee, Tchinjipjee: *Chendebi*, 27°27' 90°20'

Chuka: *Chhukha*, 27°03' 89°35'

Chupcha: *Kyapcha*, 27°12' 89°33'

Dairang (nr *Dewangiri*).

Deo Panee, Deo Nuddee (river nr *Dewangiri*).

Dewangiri, Dewangeri: *Dewangiri*, 26°50' 91°25'

Dhonglaila, Doonglala: *Donga La*, 27°34' 91°17'

Dimree Nuddee (near Sasee): *Temri Chu*, 27°07' 91°25'

Dimree Nuddee (near Tassgong): *Bamri Chu*, 27°17' 91°33'

Durunga river (in India, S of *Dewangiri*).

Geeree Nuddee, Giri Nuddee: *Diri Chu*, 27°10' 91°26'

Ghoomkhura, Ghoomkhurra: *Ghunkarah*, 27°24' 91°34'

- Gnee river (? = *Tang Chu*, W of *Pele La*).
 Gygoogoo: *Giengo*, 26°50' 89°34'
 Gylong (village nr *Punakha*).
 Gylong (above *Kyapcha*).
 Jaisa: *Gyetsa*, 27°30' 90°39'
 Juggur, Byagar: *Byakar*, 27°33' 90°34'
 Khegumpa: *Keri Gumpa*, 27°02' 91°25'
 Khoomum river: *Khoma Chu*, 27°39' 91°11'
 Khumna: 27°26' 91°37'
 Kollong river: *Kulong Chu*, 27°32' 91°32'
 Kooree Nuddee: *Kuru Chu*, 27°37' 91°11'
 Lamnoo, Lomnoo, Somnoo: *Simu Dzong*, 27°23' 89°36'
 Linge, Singe: *Linji*, 27°35' 91°13'
 Lingling, Lengloon, Singlang: *Lhuntse*, 27°39' 91°09'
 Matchien: *Mo Chu*, 27°37' 89°50'
 Matseesun river: *Mangde Chu*, 27°28' 90°29'
 Minzapeeza (waterfall in lower *Raidak* valley).
 Monass River: *Manas River*, 27°20' 91°34'
 Murichom: *Marichong*, 26°54' 89°36'
 Niddapek (? nr *Tashiling*).
 Nulka: *Ngalangkang*, 27°27' 91°36'
 Oongar, Oonjar: *Unjar*, 27°31' 91°05'
 Panga (N of *Kyapcha*): *Paga*, 27°16' 89°35'
 Panukka, Punukka: *Punakha*, 27°37' 89°51'
 Patchien: *Pho Chu*, 27°38' 89°51'
 Peemee, Pemee: *Pimi*, 27°34' 90°59'
 Phain, Thae: 27°28' 89°55'
 Phoolong, Phullung: *Phalang*, 27°30' 91°34'
 Punukka, Punukha, Panukka: *Punakha*, 27°37' 89°51'
 Punukha, Punugga: *Bunakha*, 27°07' 89°34'
 Rodoola: *Rudong La*, 27°35' 90°55'
 Roongdong, Roondong: *Rontung*, 27°16' 91°33'
 Rydang (near *Dewangiri*): *Raidong*, 26°57' 91°29'
 Rydang (W of *Tongsa*): *Ritang*, 27°33' 90°09'
 Sanah: *Sana*, 27°35' 91°23'
 Santagong: *Samtengang*, 27°31' 90°00'
 Sasee, Sassee: *Sassi*, 27°08' 91°25'
 Singe, Linge: *Linji*, 27°35' 91°13'
 Singlang, Lingling: *Lhuntse*, 27°39' 91°09'
 Somnoo, Lamnoo, Lomnoo: *Simu Dzong*, 27°23' 89°36'
 Symtoka: *Sintoka*, 27°26' 89°41'
 Taseeling: *Trashiling*, 27°27' 90°07'
 Tassangsee: *Tashi Yangtisi*, 27°34' 91°28'
 Tassgong, Benka: *Tashigang*, 27°19' 91°34'
 Tassisdun: *Tashi Cho Dzong*, 27°29' 89°38'
 Tassyassy, Tassyassee, Tassangsee: *Tashi Yangtisi*, 27°34' 91°28'
 Tchinipjee, Chindipjee: *Chendebi*, 27°27' 90°20'
 Teemboog, Timboo river: *Thimphu Chu*, 27°26' 89°39'
 Telagang, Telagoung: *Tinlegang*, 27°31' 89°48'
 Thae, Phain: 27°28' 89°55'
 Timboo river: *Thimphu Chu*, 27°26' 89°39'
 Tongsa: *Tongsa*, 27°30' 90°30'
 Tumashoo: *Tamashu*, 27°34' 91°10'
 Ungchien: *Tang Chu*, 27°34' 90°48'
 Wandipore: *Wandu Phodrang*, 27°28' 89°54'
 Woolookka, Woollakkoo: *Olaka*, 27°27' 89°40'

COOPER

Roland Edgar Cooper (1890–1962) was, after Griffith, only the second botanist to make a major collection of plants in Bhutan. Brief biographical notes have been published by Fletcher (1962) and Coats (1969). His introduction to Indian botany came when he joined the staff of the Calcutta Botanic Garden with his guardian, William Wright Smith, in 1907. Both moved to Edinburgh in 1910, but soon after, in 1913, Cooper returned to India on a collecting trip to Sikkim sponsored by the English horticulturist A. K. Bulley. In the following two years he was able to travel extensively in Bhutan under the same sponsorship. Cooper himself has described these expeditions in several papers (Cooper 1929b, 1930, 1933, 1942, 1949).

In 1914 he entered SW Bhutan on July 1st by the Sinchu La and left again by the same route on November 23rd. His botanical activities were concentrated on W-Central Bhutan between Paro and Byakar, and on three of the northern valleys of that region, the Thimphu Chu, Mo Chu and Bumthang Chu, all of them previously unexplored by botanists. In 1915 he entered again by the SW route on April 18th and during the first two months covered much of the same ground as in 1914, but not surprisingly found many different plants because of the difference in season. Thereafter he ex-

explored the upper Bumtang Chu and Byakar mountains in greater detail before moving on to other botanically unknown areas farther east in the Lhuntse, Mongar, Tashi Yangtse and Tashigang districts, finally returning westwards in early September, visiting the unexplored Black Mountain range on the way. He left Bhutan for the last time by his usual route on October 10th. He did not return to the Edinburgh Garden, however, until 1930 (later becoming curator there) because of military service in NW India during the first world war and his subsequent appointment as curator of the Maymyo Botanic Garden in Burma.

The main objectives of Cooper's expeditions to Bhutan, a reflection both of his own interests and his sponsorship, were to seek new plants of horticultural interest, especially in the genera *Primula* and *Rhododendron*, and by collecting seed to introduce these to British gardens. Making a general herbarium collection of other plants was clearly of lesser importance to him, but he very creditably assembled 2675 and 1283 collections of dried plants on his 1914 and 1915 trips respectively.

In discovering "new" plants Cooper was eminently successful because no fewer than nineteen species of *Primula* and eight of *Rhododendron* were described from his collections (Cooper 1928, 1933). Of the *Primulas*, however, only six are now maintained as good species: *P. chasmophila* [Balf. f. & Cooper ex] Hutch. (4822), *P. eburnea* Balf. f. & Cooper (4236), *P. erythrocarpa* Craib (3828), *P. strumosa* Balf. f. & Cooper (4072), *P. umbratilis* Balf. f. & Cooper (2134), and *P. xanthopa* Balf. f. & Cooper (4293, 4972). Of these *P. eburnea* was Cooper's favourite, described by him (Cooper 1933, p. 81) as "The gem of the whole of the eastern Himalaya". The difficulties in obtaining seed of it were described elsewhere in greater detail (Cooper 1929a). Most of his *Rhododendrons* are now considered to be synonyms of other species, except for *R. papillatum* Balf. f. & Cooper (3855) and *R. rhabdotum* Balf. f. & Cooper (3937), the latter described by Cooper (1933, p. 67) as "a marvel with large red stripes down the four-inch white corolla", although it is now considered to be a variety of *R. dalhousiae* Hook.f.. In his second objective, that of establishing these novelties in British gardens, Cooper was unfortunately rather less successful: although a number of *Rhododendrons* survived, most of the *Primulas* did not (Coats 1969).

Once the *Primulas* and *Rhododendrons* had been "creamed off", the remainder of his herbarium, with a few noteworthy exceptions, was tragically neglected both by Cooper himself and contemporary botanists for a variety of reasons. The main one was probably that due to the war, Cooper remained in India and after shipping the 'cream' to Sir Isaac Bayley Balfour in Edinburgh, much or all of the remainder was placed in storage in Calcutta for many years, possibly until 1930 when he returned to Edinburgh. Poor storage conditions in Calcutta caused much deterioration, and as a result of this (and Cooper himself having other interests) they were further neglected until 1952, when, after his retirement, they were re-examined and duplicates sent to the British Museum. By this time Ludlow and Sherrieff had revisited most of Cooper's localities in Bhutan and had re-found the majority of his discoveries. The few striking exceptions, alluded to above, which were recognised at the time as important new discoveries included *Buddleia cooperi* W.W. Smith (4154), the accidental discovery of

which has been described by Cooper (1942, pp. 11–12), *Gentiana prolata* Balf. f. (3499) and the spectacular *Lobelia nubigena* Anthony (4099) discovered on the Yato La ridge (Anthony 1936).

Recent study of Cooper's herbarium in Edinburgh shows it to be almost completely intact, and although many specimens are of poor quality, most are identifiable. Had the rest of his herbarium been as carefully studied as those specimens mentioned above, many undescribed taxa would have come to light. In recent years most of these have been described from later collections, in particular those of Ludlow and Sherriff. A few such species are *Agapetes sikkimensis* Airy Shaw (Cooper 3677), *Allium rhabdotum* Stearn (3245, 4816), *Corydalis aurantiaca* Ludlow (4033), *Cremanthodium bhutanicum* Ludlow (4279, 4976), *Delphinium muscosum* Exell & Hillcoat (4791), *Desmodium williamsii* Ohashi (3216), *Eriosema himalaicum* Ohashi (2856, 3417, 4462), *Galium pusillosetosum* Hara (2486), *Geum macrosepalum* Ludlow (1963, 4036), *Picrorhiza scrophulariifolia* Pennell (1849, 4061, 4812), *Rubus pectinaroides* Hara (4402), *Swertia pseudo-hookeri* H. Smith (4769), *Swertia staintonii* H. Smith (1994, 2990) and *Viola bhutanica* Hara (2265).

In spite of this unfortunate neglect, the herbarium still contains much valuable material: probably around 200 species are known from Bhutan only from specimens collected by Cooper, mostly of more tropical elements neglected by later collectors. Examples of such plants are: *Adenia trilobata* (Roxb.) Engl. (1075), *Aeschynanthus superbus* Clarke (4705), *Actinidia strigosa* Hook. f. & Thoms. (4692), *Acrocarpus fraxinifolius* [Arn. ex] Wight (3729), *Bauhinia scandens* L. (4947), *Balanophora polyandra* Griff. (3657, 4928), *Cynanchum corymbosum* Wight (3666), *Cochlianthus gracilis* Benth. (2244), *Desmodium renifolium* (L.) Schindl. (2635), *Girardinia cuspidata* (Bl.) Kurz (3974, 4951), *Hoya fusca* Wall. (4678), *Hydnocarpus kurzii* Warb. (3660), *Lepionurus sylvestris* Bl. (3723), *Maclura cochinchinensis* (Lour.) Corner (3766), *Neocinnamomum caudatum* (Nees) Merr. (3412), *Oroxylum indicum* (L.) Vent. (3399), *Schoepfia fragrans* Wall. (4632), *Terminalia chebula* Retz. (1097, 2470), *Thunbergia fragrans* Roxb. (4725) and *Toxicarpus himalensis* Falconer (3790). It is likely that a few undescribed taxa remain undetected in his herbarium: a recent example of such a plant was the discovery of a new subspecies of *Leucophysalis yunnanensis* (Kuang & Lu) Averett (3943), a genus previously unknown in the Himalayas or India (Grierson & Long 1978).

The following outline of Cooper's itinerary and gazetteer of his localities have been reconstructed mainly from his field books, preserved in the Royal Botanic Garden, Edinburgh, and to a lesser extent from his published papers. Diaries of his travels in Bhutan along with an annotated map, recently generously donated to the Garden by Mrs Cooper, have yielded additional information. However, many doubtful gaps in his itinerary remain; additional confusion is caused by the fact that his sequence of collecting numbers is very often not chronological. It is possible that many labels were written from memory at a much later date, or from information in other notebooks no longer extant. Although the majority of his place-name spellings differ slightly from modern equivalents, most have been localized on the map of Karan (1967), except for some which are mostly in eastern Bhutan as in the Mongar and upper Bumtang Chu districts.

ITINERARY, 1914 (fig. 2)

Place name spelling follows that used in Cooper's field-books; altitudes in feet are those at which he collected plants in or near those localities.

- 20-30 vi: Buxa (2000')
 1 vii: entered Bhutan at Singchu La (5500'); N to Giangoh (4·5-5000').
 2 vii: N to Thabji & Mirichoma (3-4000').
 3 vii: N to Geddulum & Dhumeysa (3-3500').
 4 vii: N to Chukka (4-5000').
 5 vii: Chukka (5000').
 6 vii: N to Bunakha, Lamnakha & Chapcha (6-8000').
 7 vii: Chapcha (7000').
 8 vii: crossed Semu La (8500'); N to Paga (7200').
 9-11 vii: N to Simu Jong & Tsalimarphe (7000'); to Tashichudjong (8000').
 12-14 vii: Tashichudjong (8000').
 15 vii: along Timpu Chu N to Dotena (8000').
 16 vii: Dotena (8000').
 20-25 vii: Lingshi & district: Chebisa (14000'); Phile La (15000'); Shado (12000'); Yele La (17000').
 26 vii: SE to Parshong (12-13000').
 27-28 vii: Parshong (12-13000').
 29-31 vii: SE to Dotena (8000'); Zado La & Tangu Gumpa (9000').
 1-16 viii: Timpu & district (8000'); Fujudin, Sinchu La (10-13000').
 17 viii: E to Duke La (9-10000'); & Tilagong (7000').
 18 viii: Tilagong (6·5-7000').
 19 viii: N to Punakha (4500').
 20 viii: Punakha (4·5-5000').
 21 viii: N up Mo Chu to Rinchu & Kancham (5-6000').
 24-26 viii: Gichha (7-10000').
 27-29 viii: returned S along Mo Chu to Tembe, Kancham & Rinchu (5-7000').
 30 viii: S to Punakha (4500').
 31 viii-76 ix: Punakha & district (4·5-5000'); Neptaika (5000').
 76 ix: S to Angduphorang (4500').
 7 ix: E to Samtigong (6-7000').
 8 ix: to Ridang (8000').
 9 ix: crossed Pilelee La (10000'); E to Rukubje (9-10000').
 10 ix: E to Tashiling (7500').
 11 ix: NE to Tongsa (7000').
 12 ix: crossed Yato La (9-10000'); E to Jaisah (9000').
 13-14 ix: Kiki La (10-11000').
 20-24 ix: Upper Bumtang Chu (Champa) district: Shabjethang (9500'); Kopub (10500'); Lhabja (12500'); Champa (12000'); Tolegang (14000'); Kurmathang (13000'); Shazo Lake (10000').
 27 ix-73 x: Biaka (9500').
 3-4 x: crossed Kiki La (10500'); crossed Yato La (10000'); E to Tongsa (8500').
 4-6 x: Tongsa (7000').
 6 x: SW to Tashiling (7000').
 7 x: W to Rukubje (10000').
 8 x: crossed Pilelee La (10500'); W to Ridang (9000').
 9 x: W to Samtigong (6-7000').
 10 x: W to Angduphorang (4500').
 711 x: Angduphorang (4500').
 12-13 x: crossed Henle La (9000'); W to Simtoka & Chalimarphe (8000').
 14-718 x: Timpu (7500').
 718-19 x: N up Timpu Chu to Parshong (12·5-13000').
 20 x: NW to Shado (13000').
 21 x: NW to Lingshi (14000').
 22-26 x: Lingshi & district (13-14000'); Phile La (14-16000'); Chebisa (12500').
 26 x: returned SE to Shado (13000').
 27 x: SE to Parshong (13-14000').
 28 x: Parshong (10-13000').
 29 x: SE to Dotena (8000').
 30 x: S to Timpu (7500').
 31 x-6 xi: Timpu (7·5-9000').
 6 xi: S to Chalimarphe & Simu Djong (7500').
 7 xi: W to Bela Djong (10-11000'); W to Paro (9000').
 8-15 xi: Paro (8-10000').
 16 xi: SE to Dorbjir Djong (8500').
 17 xi: S to Chapcha (8500').
 18 xi: S to Chukka (5000').
 19 xi: S to Choonsam (3500').
 20 xi: S to Mirichoma (3000').
 21 xi: S to Giangoh (4000').
 22-23 xi: S to Buxa (India) (5000').

ITINERARY, 1915 (fig. 3)

- 18 iv: from Buxa (2000'); crossed Sinchu La (4000'); N to Giangoh (2000').
 19 iv: N to Mirichoma (3000').
 20-21 iv: Mirichoma (3000').
 22 iv: N to Chukka (4000').
 23-24 iv: Chukka (4-6000').
 24 iv: N to Chapcha (7000').
 25-29 iv: N to Dorbjir Djong (6000'); NW to Paro (6-8000').
 30 iv-9 v: Paro district (8-13000'); Domgit Djong (7000'); NW to Ghassa (10-13000'); Tremo La (14000').

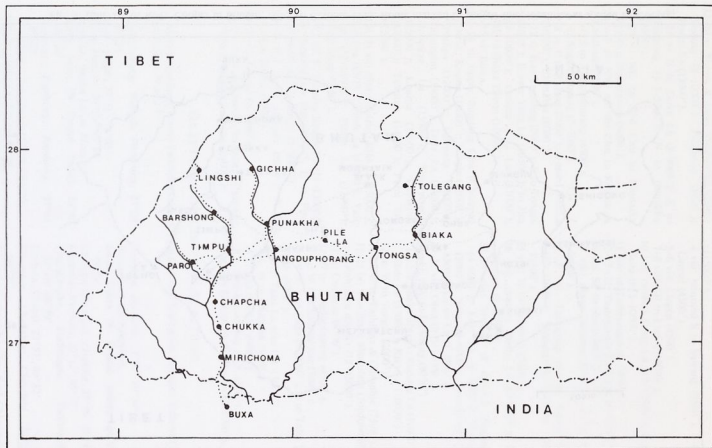


FIG. 2. Itinerary of R. E. Cooper in Bhutan, July to November 1914. Route marked by dotted line; localities as spelled by Cooper.

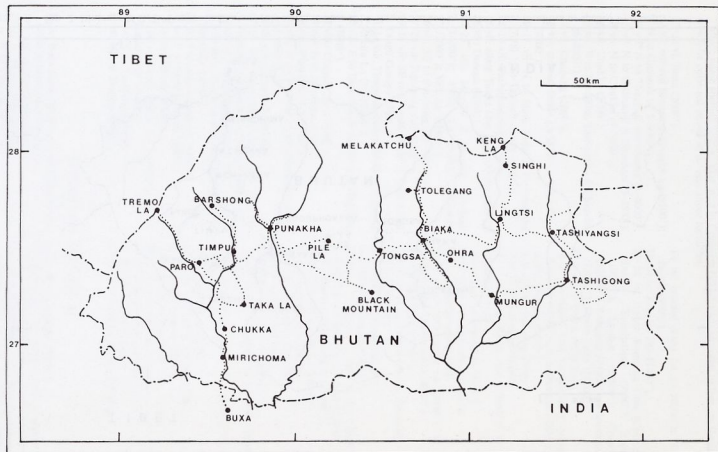


FIG. 3. Itinerary of R. E. Cooper in Bhutan, April to October 1915. Route marked by dotted line; localities as spelled by Cooper.

- 9 v: E to Bela La & Bela Djong (10000').
 10-11 v: Pimethanka & Chalimarphe (7-10000').
 12-20 v: Timpu & upper Timpu Chu valley: Dotena (8-10000'); Parshong (9000'); Pumo La (13000').
 21-23 v: E to Duke La (8-9000'); E to Tilagong (4.5-5000'); N to Punakha (4500').
 23-29 v: NE up Pho Chu to Neptaika (5000'); Dongaysam (6000').
 30 v-3 vi: NW up Mo Chu to Rinchu & Kancham (5000').
 5 vi: S to Angduphorang (4500').
 6 vi: Angduphorang (5-7000').
 7-8 vi: E to Ridang (9000'); crossed Pile La (10500'); Chenabje (8000').
 9-12 vi: E to Tashiling (7000'); E to Tongsa (7000'); E over Yato La (10500'); to Jisa (9-10000'); crossed Kiki La (11000'); NE to Biaka Djong (10000').
 12-15 vi: Biaka.
 217-26 vi: upper Bumtang Chu (Champa) district: Kopup (10000'); Langla (11000'); Champa (12000'); Tolegang (13000'); Taasiegem (14000'); Dole La (15000'); Hoopkye La (15000'); Sharritseem (15000'); Lhabja (12000'); Damkora (14000'); Tchutan (14000'); Pami Tso (15000').
 28 vi-21 vii: Biaka district: Kiki La (13000'); Kyertsas (8500'); Tibde La (13000'); Yato La (12-14000'); Penge La (13000'); Pumthang (9500').
 22-23 vii: E, crossing Kempe La (11-13000') & Rudong La (10-13000'); E to Pimi (9-10000'); E to Anjor (6-8000').
 24-25 vii: E to Manjibi (6000'); N to Lingtsi Djong (5000').
 26-27 vii: Lingtsi (5-7000').
 28-29 vii: N up Khoma Chu valley to Sawang (7000'); crossed Treb La (10000').
 30 vii-3 viii: N to Singhi Djong & district (11-12000'); Narim Tang (14000'); Julu (10-11000'); Tosamani (10500'); Keng La (15000').
 4 viii: returned S to Sawang (8500'); S to Lingtsi (4500').
 5-6 viii: Lingtsi (4500').
 7-8 viii: SE to Linji (5-9000').
 10 viii: crossed Dong La (10-12500'); E to Sana (8.5-10000').
 11 viii: to Tashiyangsi (6-7000').
 12-15 viii: Tashiyangsi & district (6-12000').
 16 viii: SE to Shali (6000').
 17 viii: along Dangma Chu to Tashigong (8000').
 18-25 viii: Tashigong district: Preng La (12-13000'); Praunzong Gompa (10-11500').
 25 viii: W to Damoitsi (7000').
 26 viii: crossed Bagla La (5-6500'); to Mongar (3-6000').
 27-29 viii: Mongar & district: Ngasam (4-6000'); Kole La (6-7000'); Shonga (3000'); Sally (4-6000'); Seemgong (8-8500'); Latun La (5-8000').
 29-31 viii: Ohra (9.5-11000').
 31 viii: NW to Pumtang (9000').
 1-12 ix: Biaka district: Rudong La (11000'); Tibde La (13000'); Kiki La (10000').
 12 ix: W to Tongsa (7000').
 14 ix: W to Tashiling & Chenabje (7500').
 15-21 ix: S to Black Mountain (Joedownchi) & Pobjacka district (12-15000').
 21 ix: Codakka (8500').
 22-27 ix: Angduphorang (4500').
 27 ix: W to Chalimarphe (7000').
 28-30 ix: S to Paga (7-8000'); E to Taka La (10-15000').
 1-3 x: Taka La area (13-15000').
 4 x: W to Chapcha (5000').
 6 x: S to Chukka (4000').
 8 x: S to Mirichoma (3.5-4500').
 10 x: left Bhutan by Sinchu La (5-6000').

GAZETTEER OF COOPER LOCALITIES

Modern spellings, mostly following the map of Karan (1967) are given in italics, followed by co-ordinates N and E.

Anduphorang: *Wangdu Phodrang*, 27°28' 89°54'
 Anjor: *Unjar*, 27°31' 91°05'
 Arika: *Pasikha*, 26°56' 89°36'
 Bagla La, Bagha La (nr *Mongar*).
 Baksa, Buxa (W Bengal, India): 26°45' 89°36'
 Barshong, Parshong: *Barshong*, 27°42' 89°33'
 Bela Djong: *Bela Dzong*, 27°26' 89°29'
 Bela La: *Bela La*, 27°26' 89°29'
 Biaka: *Byakar*, 27°33' 90°43'

Bunakha: *Bunakha*, 27°07' 89°34'
 Bungeghow (nr *Kyapcha*).
 Buxa, Baksa (W Bengal, India): 26°45' 89°36'
 Champa (Tsampa): *Chamka*, 27°49' 90°43'
 Chapcha: *Kyapcha*, 27°12' 89°33'
 Chalimarphe, Tsalimarphe: *Tsalimarphe*, 27°26' 89°39'
 Chebisa, Chebsi: 27°57' 89°32'
 Chenebje, Chenabje: *Chendebi*, 27°27' 90°20'
 Choonsam (*Raidak valley*, S of *Chhukha*).

- Chukka: *Chhukha*, 27°03' 89°35'
 Codakka (between *Black Mountain* and *Wangdu Phodrang*).
 Damkora: *Damakura*, 27°55' 90°44'
 Damoitsi: *Damoitsi*, 27°18' 91°26'
 Dangma Chu (nr *Tashigang*).
 Dhumeysa (nr *Marichong*).
 Doke La, Duke La: *Dochu La*, 27°29' 89°45'
 Dole La: 27°48' 90°38'
 Domjit, Domgit Djong: *Drugye Dzong*, 27°30' 89°19'
 Dongay Sam: 27°41' 89°57'
 Dongo La, Dong La: *Donga La*, 27°34' 91°17'
 Dorbjir Djong: *Darbir Dzong*, 27°17' 89°32'
 Dotena: *Dotanang*, 27°35' 89°38'
 Duke La, Doke La: *Dochu La*, 27°29' 89°45'
 Fujudin, Phajudin: *Pajoding*, 27°29' 89°35'
 Gaiyen (nr *Lingshi*).
 Geddulum: *Gedu*, 26°55' 89°34'
 Ghassa (Paro Chu): *Gunisawa*, 27°37' 89°16'
 Giangoh, Giagoh: *Giengo*, 26°50' 89°34'
 Gichha: *Gasa*, 27°55' 89°46'
 Gnatsa, Ngasam (nr *Mongar*).
 Gueylapunka (nr *Tashi Yangtisi*).
 Henle La: *Hinglai La*, 27°26' 89°46'
 Hoopkye La (upper *Bumthang Chu* distr.).
 Jaisa, Jisa: *Gyetsa*, 27°30' 90°39'
 Joedowchi: *Black Mountain*, 27°16' 90°23'
 Julu (*Khoma Chu*, N of *Sawang*).
 Kancham: *Kencho*, 27°50' 89°46'
 Kempe La: 27°35' 90°54'
 Keng La: *Gong La*, 28°00' 91°12'
 Khamna: 27°27' 91°36'
 Khoma Chu (valley N of *Lhuntse*).
 Kiki La: *Kyikyil La*, 27°31' 90°41'
 Kole La (nr *Mongar*).
 Kopub, Kopup Rock: 27°48' 90°35'
 Kurmathang: 27°47' 90°42'
 Kyertsas (S of *Byakar*).
 Lado La, Latun La: 27°19' 91°04'
 Lamnakha (nr *Kyapcha*).
 Lamsi La: 27°25' 90°15'
 Langla (upper *Bumthang Chu* distr.).
 Latun La, Lado La: 27°19' 91°04'
 Lhabja: 27°51' 90°43'
 Lingshi Djong: *Lingshi Dzong*, 27°55' 89°27'
 Lingsi, Lhuntzi: *Lhuntse*, 27°39' 91°09'
 Linji: *Linji*, 27°35' 91°13'
 Lumpi (nr *Tashi Yangtisi*).
 Manjibi: *Manjibi*, 27°33' 91°09'
 Melakatchu: *Mon La Karchong*, 28°04' 90°39'
 Mirichoma: *Marichong*, 26°54' 89°36'
 Monborong (nr *Tashi Yangtisi*).
 Mungur: *Mongar*, 27°16' 91°12'
 Narim Tsang, Narim Tang: *Narim Thang*, 27°57' 91°13'
 Neptaika: *Neptengka*, 27°41' 89°53'
 Ngasam (nr *Mongar*).
 Ohra: *Ura*, 27°25' 90°55'
 Paga: 27°16' 89°35'
 Pakodyam (nr *Chhukha*).
 Pami Tso (lake below *Mon La Karchong*).
 Paro Djong: *Paro Dzong*, 27°25' 89°25'
 Parshong, Barshong: *Barshong*, 27°42' 89°33'
 Penge La: 27°30' 90°34'
 Phajudin, Fujudin: *Pajoding*, 27°29' 89°35'
 Phakang (nr *Lhuntse*).
 Phile La: *Lingshi La*, 27°57' 89°26'
 Pianju: 26°56' 89°37'
 Pile La, Pililee La: *Pele La*, 27°32' 90°11'
 Pimethanka: *Pyemitangka*, 27°27' 89°32'
 Pimi: *Pimi*, 27°34' 90°59'
 Pobchaka, Pobjacka (distr. W of *Black Mountain*).
 Pome La: *Pumo La*, 27°28' 89°34'
 Praunzong Gompa (SE of *Tashigang*).
 Preng La (SE of *Tashigang*).
 Pumo La: *Pumo La*, 27°28' 89°34'
 Pumthang: *Bumthang*, 27°35' 90°50'
 Punakha: *Punakha*, 27°37' 89°51'
 Reb La, Treb La: *Yeb La*, 27°44' 91°12'
 Ridang: *Ritang*, 27°33' 90°09'
 Rinchu: *Rinchu*, 27°40' 89°46'
 Rocha (nr *Tashi Yangtisi*).
 Rudong La, Rudo La: *Rudong La*, 27°35' 90°55'
 Rukubje: *Rukubi*, 27°29' 90°17'
 Rydak valley: *Raidak valley*, 27°01' 89°24'
 Saling, Sally: *Saling*, 27°16' 91°06'
 Samtigong: *Samtengang*, 27°31' 90°00'
 Sana: *Sana*, 27°35' 91°23'
 Sawang: *Sawang*, 27°43' 91°13'
 Seemgong, Singong (nr *Shongar*).
 Semu La: *Semi La*, 27°13' 89°33'
 Shabjethang: *Shabejetang*, 27°40' 90°43'
 Shado: *Shodug*, 27°45' 89°27'
 Shali: *Shali*, 27°29' 91°35'
 Sharrytseem (upper *Bumthang Chu*).
 Shazo, Shazo Lake (upper *Bumthang Chu*).
 Shingkarap: *Shingkarap*, 27°37' 89°16'
 Shonga Djong: *Shongar Dzong*, 27°15' 91°06'
 Simtoka: *Sintoka Dzong*, 27°26' 89°41'
 Simu Djong: *Simu Dzong*, 27°23' 89°36'
 Sinchu La (NE of *Thimphu*): *Sinchu La*, 27°32' 89°42'
 Sinchu La, Singchu La (SW Bhutan): *Sinchula*, 26°48' 89°37'
 Singhi Djong: *Singhi Dzong*, 27°55' 91°13'
 Singong, Seemgong (nr *Shongar*).
 Taasiegem (upper *Bumthang Chu*).
 Taka La: *Tarka La*, 27°13' 89°42'

- Tana Soom (nr *Kyapcha*).
 Tang Chu (nr *Bumthang*), 27°35' 90°50'
 Tangu Gumpa: *Tanga Gumpa*, 27°35' 89°39'
 Tashichu Djong: *Tashi Cho Dzong*, 27°29' 89°38'
 Tashigong: *Tashigang*, 27°19' 91°34'
 Tashiling: *Trashiling*, 27°27' 90°27'
 Tashiyangsi: *Tashi Yangtsi*, 27°34' 91°28'
 Tchutan (below *Mon La Karchong*).
 Tembje: *Tamji*, 27°51' 89°45'
 Thabji: 26°50' 89°37'
 Thungsi La: *Thungsi La*, 27°25' 90°58'
 Tibde La: 27°24' 90°42'
 Tilagong: *Tinlegang*, 27°31' 89°48'
- Timpu: *Thimphu*, 27°29' 89°38'
 Tolegang: 27°49' 90°39'
 Tongsa: *Tongsa*, 27°30' 90°30'
 Tosamani: *Tosumani*, 27°52' 91°15'
 Treb La, Reb La: *Yeb La*, 27°44' 91°12'
 Tremo La: 27°42' 89°11'
 Trib La (nr *Tashi Yangtsi*).
 Tsalimape, Chalimarphe: *Tsalimaphe*, 27°26' 89°39'
 Ungar: *Unjar*, 27°31' 91°05'
 Unji, Linji: *Linji*, 27°35' 91°13'
 Yato La: *Yuto La*, 27°31' 90°35'
 Yele La: *Yale La*, 27°51' 89°26'
 Zado La: *Jato La*, 27°34' 89°40'

ACKNOWLEDGMENTS

The author is grateful for financial support for work on the flora of Bhutan provided by the Ministry of Overseas Development. He also wishes to acknowledge the encouragement and valuable discussion given by Mr A. J. C. Grierson, who is responsible for much of the recent organisation and identification of Cooper's herbarium.

REFERENCES

- ANON. (1845). The late Mr Griffith. *Lond. Journ. Bot.* 4:371-375.
 ANON. (1848). Notices of books. Works of the late William Griffith. *Lond. Journ. Bot.* 7:446-449.
 ANTHONY, J. (1936). A remarkable alpine *Lobelia* from Bhutan. *Notes R.B.G. Edinb.* 19:175-176.
 COATS, A. M. (1969). *The quest for plants*. London.
 COOPER, R. E. (1928). The occurrence of *Rhododendron* species in Bhutan, collected by R. E. Cooper in 1914 and 1915. *Rhododendron Soc. Notes* 3:232-248.
 — (1929a). Plant collecting in Bhutan. *New Flora & Silva* 1:232-242.
 — (1929b). The story of a flower. *Blackwoods Mag.* March 1929: 390-397.
 — (1930). Plant collecting in Bhutan II. *New Flora & Silva* 2:43-49.
 — (1933). Botanical tours in Bhutan. With special reference to the occurrence of the genus *Primula*. *Notes R.B.G. Edinb.* 18:67-118.
 — (1942). A plant collector in Bhutan. *Scot. Geog. Mag.* 58:9-15.
 — (1949). Notes upon Bhutan in the Eastern Himalaya. *Journ. Roy. Hort. Soc.* 74:68-75.
 FLETCHER, H. R. (1962). Roland Edgar Cooper, F.R.S.G.S. *Year Book Roy. Soc. Edinb.* 1961-62:10-11.
 — (1975). *A quest of flowers. The plant explorations of Frank Ludlow and George Sherriff*. Edinburgh.
 GRIERSON, A. J. C. & LONG, D. G. (1978). Notes relating to the flora of Bhutan I. *Notes R.B.G. Edinb.* 36:139-150.

- GRIFFITH, W. (1840). Information respecting botanical travellers. Extracts from a journal of the mission which visited Bootan, in 1837-38, under Captain R. Boileau Pemberton. *Mag. Zoo. Bot.* 4:424-429; *Ann. Nat. Hist.* 5:119-125, 205-211, 405-409.
- (1847). *Journals of travels in Assam, Burma, Bootan, Afghanistan and the neighbouring countries*. Ed. John McClelland. Calcutta.
- (1847-54a). *Notulae ad plantas asiaticas*. 4 parts. Ed. John McClelland. Calcutta.
- (1847-54b). *Icones plantarum asiaticarum*. 4 vols. Ed. John McClelland. Calcutta.
- (1848). *Itinerary notes of plants collected in the Khasyah and Bootan mountains, 1837-38, in Affghanistan and neighbouring countries, 1839-41*. Ed. John McClelland. Calcutta.
- HOOKE, J. D. (1849-51). *The Rhododendrons of Sikkim-Himalaya*. London.
- KARAN, P. P. (1967). *Bhutan. A physical and cultural geography*. Lexington. Kentucky.
- LAMOND, J. M. (1970). The Afghanistan collections of William Griffith. *Notes R.B.G. Edinb.* 30:159-175.
- LANG, W. H. (1913). William Griffith, 1840-1845. In F. W. OLIVER (ed.) *Makers of British Botany*. Cambridge.
- STEARN, W. T. (1976). Frank Ludlow (1885-1972) and the Ludlow-Sherriff expeditions to Bhutan and south-eastern Tibet of 1933-1950. *Bull. Brit. Mus. (Nat.Hist.) Bot.* 5:243-268.
- TAYLOR, G. (1975). Historical Introduction. In FLETCHER, H. R., *A quest of flowers. The plant explorations of Frank Ludlow and George Sherriff*. Edinburgh.