

THE ASIAN GENUS NEANOTIS NOMEN NOVUM (ANOTIS) AND ALLIED TAXA IN THE AMERICAS (RUBIACEAE)¹

BY WALTER H. LEWIS²

Missouri Botanical Garden and Department of Botany, Washington University,
St. Louis, Missouri

ABSTRACT

The 14 species of *Anotis* DC. originally included in that genus by de Candolle are all referable to earlier valid genera. All species are native to the New World; none are associated with the Asian genus *Anotis* auct. A new generic name *Neanotis* is proposed for the related but distinct species indigenous to Asia and one section, 28 species, and six varieties are validated under *Neanotis*. All sectional and specific names known under *Anotis* are placed under appropriate genera. In addition, new data from the morphology of the pollen emphasize the discontinuity between the species of *Neanotis* and those of *Hedyotis* (including *Oldenlandia*).

A majority of taxonomists have included the Asian species in the rubiaceous tribe *Hedyotideae* with typically few, peltate, cymbiform seeds and the herbaceous habit under *Anotis* DC. Such was the conclusion of Hooker (1873, 1880) and Schumann (1891) who maintained the genus distinct from *Hedyotis* L. and *Oldenlandia* L. Their treatment generally has been followed in the 20th century, notably by Hutchinson (1916), Hayata (1920), Craib (1932) and Merrill & Metcalf (1937), and additional evidence will be given to illustrate that those species included under *Anotis* are separable from all other Asian members of the complex.

What proved necessary, however, was to expand this study to related taxa in the Americas for world-wide monographers had heretofore credited a few species of *Anotis* to the New World. In fact the genus was described by de Candolle (1830) as wholly American with most of the 14 species he recognized indigenous to South America. Obviously the present concept of *Anotis* differs from that outlined by de Candolle and I found it essential to resolve precisely what species he described in the New World before proceeding to questions involving Asian taxa.

Anotis was divided by de Candolle into three sections: the largest sect. *Ereicotis* DC. having 10 species, one species only in the sect. *Amphiotis* DC. and three species in the sect. *Panetos* (Raf.) DC. (*Panetos* Raf., Ann. Gen. Sci. Phys. 5: 225, 227, 1820). Nine species of the sect. *Ereicotis* are closely allied and form a homogenous grouping indigenous to the Andes. These are referable to *Arcytophyllum* Willd. ex Schult. & Schult. f. established three years earlier so that in large part *Anotis* and all but one species included under *A. sect. Ereicotis* is

¹ Supported by Grant No. GB-3825 from the National Science Foundation.

² I wish to thank Dr. R. C. Bakhuizen van den Brink of the Rijksherbarium, Leiden, for his careful review of the manuscript.

I am also grateful to the directors and staffs of herbaria (BRIU, F, GH, K, L, S, SING, US) who kindly sent specimens on loan or who extracted material for pollen analysis.

ANN. MISSOURI BOT. GARD. 53(1): 32-46, 1966.

synonymous with *Arcytophyllum*. Excluded from this grouping is *Anotis cervantesii* DC. This species, described from material collected in Mexico (Nova Hispania, Kunth s.n., photo MO from B), has suffruticose stems similar to the other nine species, but differs in fruit, seed and pollen morphology and is *Hedyotis* (*Houstonia*) *wrightii* (A. Gray) Fosb. belonging to an entirely different group of species native to North America. Even earlier than *A. cervantesii*, however, is *Hedyotis pygmaea* Roem. & Schult. based on the same material and described in 1818 so that *H. wrightii*, a name long associated with the species in Mexico, must be replaced by *H. pygmaea*.

The sect. *Amphiotis* consists only of *A. lanceolata* (Poir.) DC., a North American species having much in common with *Hedyotis pygmaea* except that the seeds are fewer and of a different morphology. The species is properly referred to *H. purpurea* (L.) Torrey & Gray var. *calycosa* (A. Gray) Fosb.

The three species included in the sect. *Panetos* are strikingly similar in habit (herbaceous and $\pm$ prostrate stems) and leaf morphology (small and rotund), but beyond these vegetative parallelisms de Candolle's assemblage is heteromorphic. *Anotis rotundifolia* (Michx.) DC. is *Hedyotis* (*Houstonia*) *procumbens* (Gmel.) Fosb. native to the southeastern U.S., *A. salzmanni* DC. (*Salzmann* s.n., type MO) is a native South American species (to Argentina, Brazil, Chile, Paraguay, Uruguay) long known under the later *Oldenlandia thesiifolia* (St.-Hil.) K. Sch. and is referable to *H. salzmannii* (DC.) Steudel. The third species included in this section is *Anotis serpens* (H. B. K.) DC. (lectotype of *Anotis*, cf. Hooker, 1873) which is *Arcytophyllum microphyllum* (Willd. ex Roem. & Schult.) Standl. based on *Houstonia microphylla*. With its angular seeds the species does not appear typical of *Arcytophyllum*, but until a revision of that genus is completed, I prefer not to transfer the species to *Hedyotis*, *Oldenlandia* or another genus (i.e. *Anotis*).

All 14 species described by de Candolle under *Anotis* can, therefore, be placed with reasonable accuracy in America taxa, namely *Arcytophyllum*, *Hedyotis* subg. *Edrisia* (Raf.) W. H. Lewis (*Houstonia*) or the pantropical *H.* subg. *Oldenlandia* (L.) Torrey & Gray or *Oldenlandia* L. s.s. No species is known to occur in Asia or to be associated with the large group of Asian species currently grouped under *Anotis*. Moreover, it is clear that de Candolle was not circumscribing Asian elements of this genus for the only species in the Prodrômus (1830) typical of *Anotis* of others was placed by him questionably in *Putoria* Pers., a genus far removed in that work from his *Anotis*.

In summary the species of *Anotis* as described by de Candolle (which in this context is illegitimate for the earlier *Panetos* Raf. is given in synonymy) are given as follows together with their correct names:

A. filiformis (Ruiz & Pav.) DC. = *Arcytophyllum filiforme* (Ruiz & Pav.) Standl.;

A. filiformis (Ruiz & Pav.) DC. = *Arcytophyllum filiforme* (Ruiz & Pav.) Standl.;

A. hypnoides (H. B. K.) DC. = *Arcytophyllum bryoides* (Willd. ex Roem. & Schult.) Diels;

A. juniperifolia (Ruiz & Pav.) DC. = *Arcytophyllum juniperifolium* (Ruiz & Pav.) Standl.;

A. microphylla (Willd. ex Roem. & Schult.) DC. = *Arcytophyllum filiforme* (Ruiz & Pav.) Standl.;

A. cervantesii (H. B. K.) DC. = *Hedyotis pygmaea* Roem. & Schult.;

A. thymifolia (Ruiz & Pav.) DC. = *Arcytophyllum thymifolium* (Ruiz & Pav.) Standl.;

A. laricifolia (Cav.) DC. = *Arcytophyllum laricifolium* (Cav.) W. H. Lewis;

A. setosa (Ruiz & Pav.) DC. = *Arcytophyllum setosum* (Ruiz & Pav.) Standl.;

A. ericoides (Willd. ex Roem. & Schult.) DC. = *Arcytophyllum ericoides* (Willd. ex Roem. & Schult.) Standl.;

A. lanceolata (Poir.) DC. = *Hedyotis purpurea* (L.) Torrey & Gray var. *calycosa* (A. Gray) Fosb.;

A. rotundifolia (Michx.) DC. = *Hedyotis procumbens* (Gmel.) Fosb.;

A. salzmanni DC. = *Hedyotis salzmannii* (DC.) Steudel;

A. serpens (H. B. K.) DC. = *Arcytophyllum microphyllum* (Willd. ex Roem. & Schult.) Standl.

Following the taxonomists of the second half of the 19th century and the majority of those in the 20th who recognized *Anotis* as distinct from *Hedyotis* or *Oldenlandia*, a new name is therefore required for *Anotis* in their sense. I propose:

Neanotis W. H. Lewis, nom. nov.

Hedyotis L. sect. *Anotis* sensu Wight & Arn., Prodr. 409, 1834, excl. *Anotis rotundifolia* (Michx.) DC.; Endl., Gen. Pl. 549, 1838, excl. ♂ *Panetos* (Raf.) Endl. & ε *Ereicotis* (DC.) Endl.

Oldenlandia L. § *Anotis* sensu Miq., Fl. Ind. Bat. 2: 193, 1857, excl. *Oldenlandia ramosissima* (Blume) Miq.

Anotis sensu Hook. f. in Benth. & Hook. f., Gen. Pl. 2: 59, 1873, excl. sect. *Serpicula* Hook. f. & sect. *Pterospora* Hook. f., non DC. (Prodr. 4: 431, 1830).

Distribution: Asia.

Type species: *Neanotis indica* (DC.) W. H. Lewis.

Type collection: *Leschenault s.n.*, Nilgherry, India, G (not seen), widely distributed in IDC Micro-Edition, Candolle Prodromi Herbarium, Fig. 1.

During a routine examination of pollen from among the Asian members of the tribe *Hedyotideae* several species were segregated by their unique pollen morphology. These included all species of *Neanotis* as listed in Appendix 1, i.e. the majority of species formerly known under *Anotis* auct. non DC. Some species included under *Anotis* auct. have also been known under *Hedyotis* and *Oldenlandia*, but the morphology of the pollen of *Neanotis* on the one hand and of *Hedyotis* and *Oldenlandia* on the other is so different that there is a distinct line of demarcation between them.



Fig. 1. *Neanotis indica* (DC.) W. H. Lewis var. *indica* (*Putoria?* *indica* DC.), type species of *Neanotis*; Leschenault s.n., Nilgherry, India, type collection reproduced from IDC Micro-Edition, Candolle Prodromi Herbarium.

The main distinguishing characters of the pollen based on the species listed in Appendix 1 are summarized as follows:

Hedyotis (Fig. 2-4)

3- to 4-aperturate, average of all species 3.3.

colpus long, $\frac{2}{3}$ to $\frac{4}{5}$ length of polar axis.

os narrow, but distinct with breadth only $\frac{1}{8}$ to $\frac{1}{5}$ length of colpus.

sexine $\pm$ thin, ca $1.5-2\mu$.

reticulation fine to medium with fine bacula and muri.

grain subspheroidal to usually prolate.

Neanotis (Fig. 5-6)

(5-)6- to 12-aperturate, average of all species 8.5.

colpus short (brevicolpate), $\frac{1}{5}$ to $\frac{1}{4}$ length of polar axis.

os wide, but vague (because of thick and coarse sexine) with breadth $\frac{1}{2}$ to $\frac{4}{5}$ length of colpus.

sexine thick, ca $3-5.5\mu$ and often thicker at the equator.

reticulation very coarse with large bacula and muri.

grain subspheroidal to usually oblate.

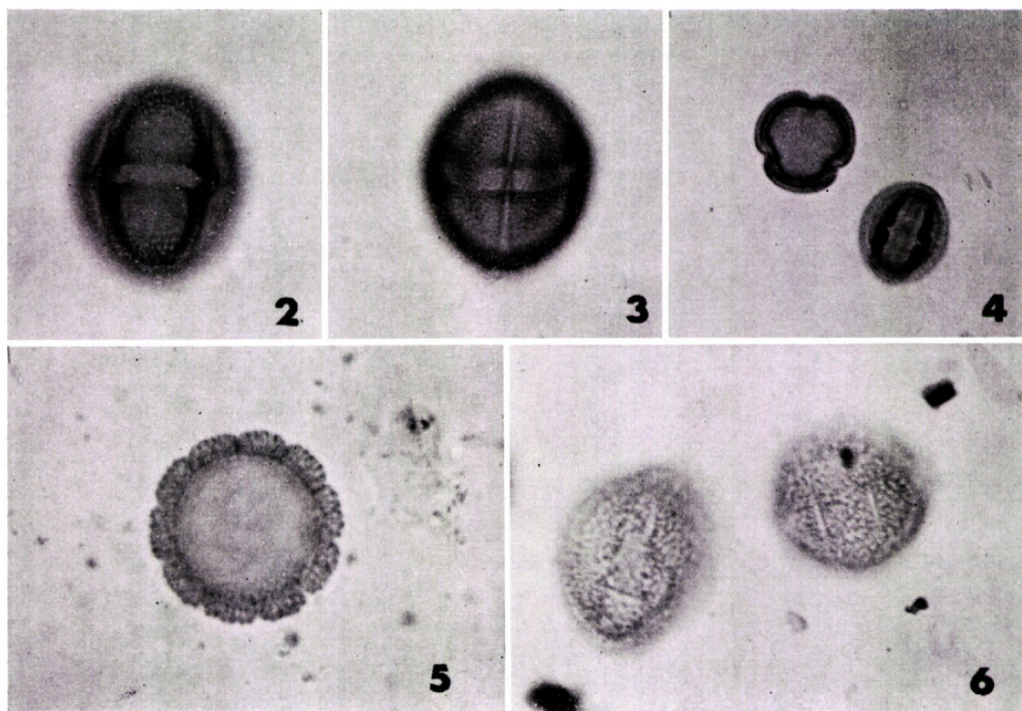


Fig. 2-6. Pollen of *Hedyotis* and *Neanotis*. $\times 400$. Fig. 2-3. *Hedyotis buxifolia* Bedd., Fischer 3558 (K), two equatorial focuses of same grain; Fig. 2 showing two colpi and the synclinorate os; Fig. 3 showing one long colpus and the synclinorate os. Fig. 4. *H. cinereo-viridis* Thw., C. P. 95 (K), showing one grain in equatorial view with two (of three) colpi and ora, and a second in polar view with three colpi. Fig. 5. *N. foetida* (Hook. f.) W. H. Lewis, Hohenacker 586 (K), showing 10 colpi and a thick sexine in polar view. Fig. 6. *N. decipiens* (Hook. f.) W. H. Lewis, Wight s.n. (K), showing several of many brevicolpi and indistinctly the broad synclinorate os in near equatorial views.

By six characters, involving most of the major criteria by which pollen is generally distinguished, the species of *Hedyotis* (including *Oldenlandia*) and *Neanotis* are separable. No other species examined in the tribe from Asia and Australia has a pollen morphology remotely similar to that known for *Neanotis* whereas that typical of *Hedyotis* is common to the tribe as a whole not only in Asia and Australia but also in Africa (Lewis, 1965a). In South and Central America (south of Mexico) and the West Indies the pollen of species in the tribe is with one exception similar to that described for *Hedyotis*. This emphasizes the distinct difference between the species grouped under *Anotis* by de Candolle, which are all of the *Hedyotis* type, and those in Asia now known under *Neanotis*. The single exception is the pollen of *Hedyotis callitrichoides* (Griseb.) W. H. Lewis, briefly referred to and incorrectly figured by Bremekamp (1952, p. 269, 297), a species native to Mexico and the West Indies and probably of recent introduction into western Africa. Like *Neanotis*, the pollen is polycolporate (8-aperturate) and usually oblate, but differs by its long colpi, narrow ora, and thin sexine $\pm$ finely reticulated as noted for species of *Hedyotis*. Palynologically the species is unique for *Hedyotis* and its position in the genus remains uncertain. Most species of *Hedyotis* in North

America also differ in pollen morphology from that typical of the *Hedyotideae* (Lewis, 1965b), although along different lines from that of *Neanotis* where multiplication of apertures rather than of their individual complexity is the most obvious specialization.

Palynologically, therefore, the species of *Neanotis* are distinct not only from their allies in Asia but also from all members of the tribe *Hedyotideae* known elsewhere. This newly described set of characters lends added support to the generally accepted position that this group of species must be set apart from *Hedyotis* s.l.

No attempt is made here to be monographic although such a study of the genus is needed. With available material I have examined as many as possible of the specific and subspecific taxa transferred below to *Neanotis*. Needed transfers may not be complete, however, and some have been omitted due to lack of specimens. Conversely, I find that several species such as *N. boerhaavioides*, *N. formosana*, and *N. kwangtungensis* are similar in vegetative characters as well as their (atypical) seed morphology. A revisionary treatment may ultimately show that a more conservative approach is necessary.

Below are proposed one section, 28 species, and six varieties under *Neanotis*.

Neanotis W. H. Lewis sect. **Patzea** (Schlecht. ex Hook. f.) W. H. Lewis, comb. nov., type species *N. wightiana* (Wall. ex Wight & Arn.) W. H. Lewis.

Anotis sect. *Patzea* Schlecht. ex Hook. f. in Benth. & Hook. f., Gen. Pl. **2**: 59, 1873.

A. sect. *Patria* Boerl., Handl. **2**: 53, 1891.

Neanotis boerhaavioides (Hance) W. H. Lewis, comb. nov.

Hedyotis boerhaavioides Hance, Jour. Bot. **8**: 73, 1870.

Anotis boerhaavioides (Hance) Maxim., Bull. Acad. Imp. Sc. St. Pétersb. **29**: 165, 1883.

Neanotis calycina (Wall. ex Hook. f.) W. H. Lewis, comb. nov.

Anotis calycina Wall. ex Hook. f., Fl. Brit. Ind. **3**: 73, 1880 (*Hedyotis calycina* Wall., Cat. no. 878, 1829, nom. nud.; Wight & Arn., Prodr. 409, 1834, nom. nud.).

Neanotis carnosa (Dalz.) W. H. Lewis, comb. nov.

Hedyotis carnosa Dalz., Hook. Jour. Bot. **2**: 135, 1850.

³ *Anotis carnosa* (Dalz.) Hook. f., Fl. Brit. Ind. **3**: 74, 1880.

Neanotis decipiens (Hook. f.) W. H. Lewis, comb. nov.

Anotis decipiens Hook. f., Fl. Brit. Ind. **3**: 72, 1880.

³ This is the first of many combinations under *Anotis* ascribed to Hook. f. in Benth. & Hook. f., Gen. Pl. **2**: 59-60, 1873, in the *Index Kewensis*. *Hedyotis carnosa*, for example, was only listed under *Anotis* in the *Genera Plantarum* and Article 33 of the *International Code of Botanical Nomenclature* expressly states that such a combination is not validly published. Fortunately, however, many invalid combinations were validly published by Hooker in the *Flora of British India* seven years later.

Neanotis foetida (Hook. f.) W. H. Lewis, comb. nov.

Hedyotis foetida Dalz., Hook. Jour. Bot. **2**: 134, 1850, non (Forst.) J. E. Smith in Rees (Cyclop. **17**, 1811).

Anotin foetida Hook. f., Fl. Brit. Ind. **3**: 74, 1880.

Neanotis formosana (Hayata) W. H. Lewis, comb. nov.

Anotis formosana Hayata, Ic. Pl. Formos. **9**: 54, 1920.

Neanotis gracilis (Hook. f.) W. H. Lewis, comb. nov.

Anotis gracilis Hook. f., Fl. Brit. Ind. **3**: 71, 1880.

Neanotis hirsuta (L. f.) W. H. Lewis, comb. nov.

Oldenlandia hirsuta L. f., Suppl. Pl. Syst. Veg. 127, 1781.

Hedyotis hirsuta (L. f.) J. E. Smith in Rees, Cyclop. **17**, 1811.

H. lindleyana Hook. ex Wight & Arn., Prodr. 409, 1834, nom. subnud.

Oldenlandia japonica Miq., Ann. Mus. Lugd.-Bat.: **3**: 109, 1867.

Hedyotis stipulata R. Br. in Wall. [Cat. no. 863a, 1829, no. 6195, 1831-32, nom. nud.] ex Hook. f., Fl. Brit. Ind. **3**: 63, 1880.

Anotis hirsuta (L. f.) Boerl., **2**: 126, 1891 (superfluously made by Miq. ex Backer & van Slooten, Geïllustr. Handb. Theekonkr. 203, 1924, and by Hochr., Candollea **5**: 246, 1934).

Neanotis hirsuta var. **glabrior** (Miq.) W. H. Lewis, comb. nov.

Hedyotis capitata Blume, Bijdr. Fl. Nederl. Ind. 973, 1826, non Lam. (Encycl. Méth. Bot. **3**: 80, 1789).

Oldenlandia hirsuta var. *glabrior* Miq., Fl. Ind. Bat. **2**: 194, 1857.

Anotis hirsuta var. *glabrior* (Miq.) Hochr., Candollea **5**: 246, 1934.

Neanotis hirsuta var. **glabricalycina** (Honda) W. H. Lewis, comb. nov.

Oldenlandia hirsuta var. *glabricalycina* Honda, Bot. Mag. Tokyo **53**: 333, 1939.

Hedyotis lindleyana Hook. ex Wight & Arn. var. *glabricalycina* (Honda) Hara, Jour. Jap. Bot. **18**: 89, 1942.

Neanotis hirsuta var. **yakusimensis** (Masamune) W. H. Lewis, comb. nov.

Oldenlandia yakusimensis Masamune, Jour. Soc. Trop. Agr. Taiwan **3**: 393, 1931.

Hedyotis lindleyana var. *yakusimensis* (Masamune) Hara, Jour. Jap. Bot. **18**: 89, 1942.

Neanotis hondae (Hara) W. H. Lewis, comb. nov.

Oldenlandia hirsuta L. f. var. *glabra* Honda, Bot. Mag. Tokyo **45**: 2, 1931.

O. glabra (Honda) Honda, loc. cit. **47**: 297, 1933, non O. Ktze. (Rev. Gen. Pl. **1**: 292, 1891).

Hedyotis hondae Hara, Jour. Jap. Bot. **18**: 90, 1942.

Neanotis indica (DC.) W. H. Lewis, comb. nov.

Putoria? indica DC., Prodr. **4**: 577, 1830.

Hedyotis leschenaultiana Wall. [Cat. no. 1298, 1829, nom. nud.] ex Wight & Arn., Prodr. 411, 1834.

Anotis leschenaultiana (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 72, 1880.

Neanotis indica var. **affinis** (Hook. f.) W. H. Lewis, comb. nov.

Hedyotis affinis Wall. [Cat. no. 1297, 1829, nom. nud.] ex Wight & Arn., Prodr. 411, 1834, non Roem. & Schult. in L. (Syst. Veg., ed. 15, **3**: 194, 1818).

Anotis leschenaultiana var. *affinis* Hook. f., Fl. Brit. Ind. **3**: 72, 1880.

Neanotis indica var. **deltoidea** (Wall. ex Wight & Arn.) W. H. Lewis, comb. nov.

Hedyotis deltoidea Wall. [Cat. no. 1296, 1829, nom. nud.] ex Wight & Arn., Prodr. 410, 1834.

Anotis leschenaultiana var. *deltoidea* (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 72, 1880.

Neanotis ingrata (Wall. ex Hook. f.) W. H. Lewis, comb. nov.

Anotis ingrata Wall. ex Hook. f., Fl. Brit. Ind. **3**: 71, 1880 (*Hedyotis ingrata* Wall., Cat. no. 863, 1829, nom. nud.).

Neanotis kwangtungensis (Merrill & Metcalf) W. H. Lewis, comb. nov.

Anotis kwangtungensis Merrill & Metcalf, Lingnan Sci. Jour. **16**: 177, 1937.

Neanotis lancifolia (Hook. f.) W. H. Lewis, comb. nov.

Hedyotis lancifolia Dalz., Hook. Jour. Bot. **2**: 135, non Schum. in Schum. & Thonn. (Beskr. Guin. Pl. **1**: 92, 1827).

Anotis lancifolia Hook. f., Fl. Brit. Ind. **3**: 73, 1880.

Neanotis longiflora W. H. Lewis, nom. nov.

Anotis longiflora Hutch., Kew Bull. **1916**: 35, 1916, non Benth. (Pl. Hartw. 23, 1839).

Neanotis monosperma (Wall. ex Wight & Arn.) W. H. Lewis, comb. nov.

Hedyotis monosperma Wall. [Cat. no. 1295, 1829, nom. nud.] ex Wight & Arn., Prodr. 410, 1834.

Oldenlandia mysorensis Wall. [Cat. no. 882, 1829, nom. nud.] ex G. Don, Gen. Syst. Gard. Bot. **3**: 531, 1834.

Anotis monosperma (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 75, 1880.

Neanotis montholoni (Hook. f.) W. H. Lewis, comb. nov.

Anotis montholoni Hook. f., Fl. Brit. Ind. **3**: 73, 1880.

Neanotis nummularia (Arn.) W. H. Lewis, comb. nov.

Hedyotis nummularia Arn., Pugill. Pl. Ind. Or. 23, 1836.

Anotis nummularia (Arn.) Hook. f., Fl. Brit. Ind. **3**: 75, 1880.

Neanotis nummulariformis (Arn.) W. H. Lewis, comb. nov.

Hedyotis nummulariformis Arn., Pugill. Pl. Ind. Or. 23, 1836.

Anotis nummulariformis (Arn.) Trimen, Syst. Cat. 42, 1885.

Neanotis oxyphylla (G. Don) W. H. Lewis, comb. nov.

Oldenlandia oxyphylla G. Don, Gen. Syst. Gard. Bot. **3**: 531, 1834.

Anotis oxyphylla (G. Don) Hook. f., Fl. Brit. Ind. **3**: 72, 1880.

Neanotis **prainiana** (W. A. Talbot) W. H. Lewis, comb. nov.

Anotis prainiana W. A. Talbot, Jour. Bombay Nat. Hist. Soc. **11**: 237, 1897.

Neanotis **quadrilocularis** (Thw.) W. H. Lewis, comb. nov.

Hedyotis quadrilocularis Thw., Enum. Pl. Zeyl. 144, 1859.

Anotis quadrilocularis (Thw.) Hook. f., Fl. Brit. Ind. **3**: 74, 1880.

Neanotis **rheedei** (Wall. ex Wight & Arn.) W. H. Lewis, comb. nov.

Hedyotis rheedei Wall. [Cat. no. 1294, 1829, nom. nud.] ex Wight & Arn., Prodr. 409, 1834.

H. latifolia Dalz., Hook. Jour. Bot. **2**: 133, 1850.

Anotis rheedei (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 73, 1880.

Neanotis **richardiana** (Arn.) W. H. Lewis, comb. nov.

Hedyotis richardiana Arn., Pugill. Pl. Ind. Or. 22, 1836.

Anotis richardiana (Arn.) Hook. f., Fl. Brit. Ind. **3**: 75, 1880.

Neanotis **ritchiei** (Hook. f.) W. H. Lewis, comb. nov.

Anotis ritchiei Hook. f., Fl. Brit. Ind. **3**: 74, 1880.

Neanotis **thwaitesiana** (Hance) W. H. Lewis, comb. nov.

Hedyotis thwaitesiana Hance, Jour. Bot. **6**: 298, 1868.

Anotis thwaitesiana (Hance) Maxim., Bull. Acad. Imp. Sc. St. Pétersb. **29**: 165, 1883.

Neanotis **trimera** (Craib) W. H. Lewis, comb. nov.

Anotis trimera Craib, Fl. Siam. Enum. **2**: 59, 1932; Kew Bull. **1932**: 127, 1932.

Neanotis **urophylla** (Wall. ex Wight & Arn.) W. H. Lewis, comb. nov.

Hedyotis urophylla Wall. [Cat. no. 6197, 1831-32, nom. nud.] ex Wight & Arn., Prodr. 409, 1834, nom. subnud.

Anotis urophylla (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 72, 1880.

Neanotis **wightiana** (Wall. ex Wight & Arn.) W. H. Lewis, comb. nov.

Hedyotis wightiana Wall. [Cat. no. 6194, 1831-32, nom. nud.] ex Wight & Arn., Prodr. 410, 1834.

Anotis wightiana (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 75, 1880.

Neanotis wightiana var. **compressa** (Wall. ex G. Don) W. H. Lewis, comb. nov.

Spermacoce compressa Wall. [Cat. no. 6187, 1831-32, nom. nud.] ex G. Don, Gen. Syst. Gard. Bot. **3**: 621, 1834.

Hedyotis wightiana var. β Wight & Arn., Prodr. 410, 1834.

Anotis wightiana var. *compressa* (Wall. ex G. Don) Craib, Fl. Siam. Enum. **2**: 59, 1932.

The number of sectional and specific names known under *Anotis* is large and I feel that it is essential to consider all of them and to at least tentatively place them under appropriate taxa. In a few instances a considerable list of synonymy is

also given particularly when the names are newly placed in that position. The sections known under *Anotis* are given first followed by the specific epithets alphabetically.

Anotis sect. *Amphiotis* DC., Prodr. **4**: 433, 1830. = *Hedyotis* subg. *Edrisia* (Raf.) W. H. Lewis.

Anotis sect. *Ereicotis* DC., Prodr. **4**: 431, 1830. = *Arcytophyllum* Willd. ex Schult. & Schult. f., pro parte, and *Hedyotis* subg. *Edrisia* (Raf.) W. H. Lewis, pro parte.

Anotis sect. *Euanotis* Hook. f. in Benth. & Hook. f., Gen. Pl. **2**: 59, 1873. = *Neanotis* W. H. Lewis sect. *Neanotis*.

Anotis sect. *Panetos* (Raf.) DC., Prodr. **4**: 433, 1830. = *Arcytophyllum* Willd. ex Schult. & Schult. f., pro parte, *Hedyotis* subg. *Edrisia* (Raf.) W. H. Lewis, pro parte, and *Hedyotis* subg. *Oldenlandia* (L.) Torrey & Gray or *Oldenlandia* L., pro parte.

Anotis sect. *Patria* Boerl., Handl. **2**: 53, 1891. = *Neanotis* sect. *Patzea* (Schlecht. ex Hook. f.) W. H. Lewis.

Anotis sect. *Patzea* Schlecht. ex Hook. f. in Benth. & Hook. f., Gen. Pl. **2**: 59, 1873. = *Neanotis* sect. *Patzea* (Schlecht. ex Hook. f.) W. H. Lewis.

Anotis sect. *Pterospora* Hook. f. in Benth. & Hook. f., Gen. Pl. **2**: 60, 1873. = *Hedyotis* L. (or *Oldenlandia* L.).

Anotis sect. *Serpicula* Hook. f. in Benth. & Hook. f., Gen. Pl. **2**: 60, 1873. = *Arcytophyllum* Willd. ex Schult. & Schult. f.

Anotis affinis, nom. illegit.⁴ = *Neanotis indica* var. *affinis* (Hook. f.) W. H. Lewis.

Anotis arnottiana (Miq.) Hochr., Candollea **5**: 245, 1934. = *Neanotis indica* (DC.) W. H. Lewis.

Anotis blumeana (DC.) Korth., Nederl. Kruid. Arch. **2**(2): 150, 1851. = *Oldenlandia biflora* L., Sp. Pl. 119, 1753.

Anotis boerhaavioides (Hance) Maxim., Bull. Acad. Imp. Sc. St. Pétersb. **29**: 165, 1883. = *Neanotis boerhaavioides* (Hance) W. H. Lewis.

Anotis calycina Wall. ex Hook. f., Fl. Brit. Ind. **3**: 73, 1880. = *Neanotis calycina* (Wall. ex Hook. f.) W. H. Lewis.

Anotis capitata (Lam.) Korth., Nederl. Kruid. Arch. **2**(2): 151, 1851. = *Hedyotis capitata* Lam., Encycl. Méth. Bot. **3**: 80, 1789.

Anotis carnosa (Dalz.) Hook. f., Fl. Brit. Ind. **3**: 74, 1880. = *Neanotis carnosa* (Dalz.) W. H. Lewis.

Anotis cervantesii (H. B. K.) DC., Prodr. **4**: 432, 1830. = *Hedyotis pygmaea* Roem. & Schult. in L., Syst. Veg., ed. 15, **3**: 526, 1818 [*Hedyotis pumila* Willd. ex Roem. & Schult. in L., loc. cit., pro syn., non L. f. (Suppl. Pl. Syst. Veg. 119, 1781)]; *H. cervantesii* H. B. K., Nov. Gen. Sp. Pl. **3**: 396, 1820; *Houstonia wrightii*

⁴ This and several other names indicated simply by nom. illegit. are given in the *Index Kewensis* and elsewhere as legitimate binomials, but unlike most combinations under *Anotis* attributed to Hook. f. in Benth. & Hook. f., Gen. Pl. **2**: 59-60, 1873, which were later validated (cf. footnote 3), these names remain illegitimate.

A. Gray, Proc. Amer. Acad. **17**: 202, 1882; *Hedyotis wrightii* (A. Gray) Fosb., Lloydia **4**: 290, 1941.]

Anotis chrysotricha Paliban, Bull. Herb. Boiss., sér. 2, **6**: 20, 1906. = *Hedyotis chrysotricha* (Paliban) Merrill, Lingnan Sci. Jour. **7**: 322, 1931.

Anotis ciliolosa G. Don, Gen. Syst. Gard. Bot. **3**: 535, 1834. = *Hedyotis canadensis* (Willd. ex Roem. & Schult.) Fobs., Virginia Jour. Sci. **2**: 110, 1941.

Anotis coerulea (L.) G. Don, Gen. Syst. Gard. Bot. **3**: 535, 1834. = *Hedyotis caerulea* (L.) Hook., Fl. Bor. Amer. **1**: 286, 1833.

Anotis conferta (Ruiz & Pav.) DC., Prodr. **4**: 431, 1830. = *Arcytophyllum filiforme* (Ruiz & Pav.) Standl., Field Mus. Nat. Hist., Bot. Ser., **11**: 183, 1936.

Anotis corymbifera Backer ex van Steenis, Bull. Jard. Bot. Buitenz., sér. 3, **13**: 246, 1934, nom. nud. = *Neanotis calycina* (Wall. ex Hook. f.) W. H. Lewis.

Anotis decipiens Hook. f., Fl. Brit. Ind. **3**: 72, 1880. = *Neanotis decipiens* (Hook. f.) W. H. Lewis.

Anotis dentelloides Cham. in Steudel, Nom. Bot., ed. 2, **1**: 101, 1840, nom. nud. pro syn. = *Hedyotis salzmännii* (DC.) Steudel, Nom. Bot., ed. 2, **1**: 728, 1841.

Anotis ericoides (Willd. ex Roem. & Schult.) DC., Prodr. **4**: 433, 1830. = *Arcytophyllum ericoides* (Willd. ex Roem. & Schult.) Standl., Field Mus. Nat. Hist., Bot. Ser., **11**: 182, 1936.

Anotis filiformis (Ruiz & Pav.) DC., Prodr. **4**: 431, 1830. = *Arcytophyllum filiforme* (Ruiz & Pav.) Standl., Field Mus. Nat. Hist., Bot. Ser., **11**: 183, 1936.

Anotis findlaysoniana, nom. illegit. (cf. footnote 4). = *Neanotis wightiana* (Wall. ex Wight & Arn.) W. H. Lewis.

Anotis foetida Hook. f., Fl. Brit. Ind. **3**: 74, 1880. = *Neanotis foetida* (Hook. f.) W. H. Lewis.

Anotis formosana Hayata, Ic. Pl. Formos. **9**: 54, 1920. = *Neanotis formosana* (Hayata) W. H. Lewis.

Anotis gentianoides Walp., Repert. **4**: 230, 1847, nom. illegit. An erroneous index name referring to *Hedyotis* (*Anotis*) *gentianoides* Endl. in Walpers Repert. **2**: 495, 1843; ascribed to Walpers in the *Index Kewensis* and later placed by Standley (Fl. N. Amer. **32**: 30, 1918) in synonymy as a legitimate binomial. = *Hedyotis caerulea* (L.) Hook., Fl. Bor. Amer. **1**: 286, 1833.

Anotis gracilis Hook. f., Fl. Brit. Ind. **3**: 71, 1880. = *Neanotis gracilis* (Hook. f.) W. H. Lewis.

Anotis hirsuta (L. f.) Boerl., Handl. **2**: 126, 1891. = *Neanotis hirsuta* (L. f.) W. H. Lewis.

Anotis hypnoides (H. B. K.) DC., Prodr. **4**: 432, 1830. = *Arcytophyllum bryoides* (Willd. ex Roem. & Schult.) Diels, Biblioth. Bot. **29**(116): 149, 1937. [*Houstonia bryoides* Willd. ex Roem. & Schult. in L., Syst. Veg., ed. 15, **3**: 527, 1818; *Hedyotis hypnoides* H. B. K., Nov. Gen. Sp. Pl. **3**: 389, 1820; *Arcytophyllum confertum* (Ruiz & Pav.) Standl. var. *bryoides* (Willd. ex Roem. & Schult.) Standl., Field Mus. Nat. Hist., Bot. Ser., **7**: 206, 1931.]

Anotis ingrata Wall. ex Hook. f., Fl. Brit. Ind. **3**: 71, 1880. = *Neanotis ingrata* (Wall. ex Hook. f.) W. H. Lewis.

Anotis juniperifolia (Ruiz & Pav.) DC., Prodr. **4**: 432, 1830. = *Arcytophyllum juniperifolium* (Ruiz & Pav.) Standl., Field Mus. Nat. Hist., Bot. Ser., **7**: 207, 1931.

Anotis kwangtungensis Merrill & Metcalf, Lingnan Sci. Jour. **16**: 177, 1937. = *Neanotis kwangtungensis* (Merrill & Metcalf) W. H. Lewis.

Anotis lanceolata (Poir.) DC., Prodr. **4**: 433, 1830. = *Hedyotis purpurea* (L.) Torrey & Gray var. *calycosa* (A. Gray) Fosb., Castanea **19**: 33, 1954.

Anotis lancifolia Hook. f., Fl. Brit. Ind. **3**: 73, 1880. = *Neanotis lancifolia* (Hook. f.) W. H. Lewis.

Anotis laricifolia (Cav.) DC., Prodr. **4**: 432, 1830. = *Arcytophyllum laricifolium* (Cav.) W. H. Lewis, Ann. Missouri Bot. Gard. **53**: 110, 1966.

Anotis lechleriana Schlecht., Linnaea **28**: 488, 1856. = *Arcytophyllum filiforme* (Ruiz & Pav.) Standl., Field Mus. Nat. Hist., Bot. Ser., **11**: 183, 1936.

Anotis leschenaultiana (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 72, 1880. = *Neanotis indica* (DC.) W. H. Lewis.

Anotis longiflora Benth., Pl. Hartw. 23, 1839. = *Bouvardia multiflora* (Cav.) Schult. & Schult. f., Mant. Vol. Ter. Syst. Veg. L. (ed. Roem. & Schult.) 118, 1827.

Anotis longiflora Hutch., Kew Bull. **1916**: 35, 1916, non Benth. (Pl. Hartw. 23, 1839). = *Neanotis longiflora* W. H. Lewis.

Anotis microphylla (Willd. ex Roem. & Schult.) DC., Prodr. **4**: 432, 1830. = *Arcytophyllum filiforme* (Ruiz & Pav.) Standl., Field Mus. Nat. Hist., Bot. Ser., **11**: 183, 1936.

Anotis ? *minahassae* Koorders in Koorders & Schum., Syst. Verz. **3**: 119, 1914, nom. nud. = not known.

Anotis mitrasacmoides (F. Muell.) Domin, Biblioth. Bot. **22**(89): 1170, 1929 (incorrectly ascribed to Benth. & Hook. f., Gen. Pl. **2**: 60, 1873). = *Hedyotis mitrasacmoides* F. Muell., Fragm. **4**: 37, 1863.

Anotis monosperma (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 75, 1880. = *Neanotis monosperma* (Wall. ex Wight & Arn.) W. H. Lewis.

Anotis montholoni Hook. f., Fl. Brit. Ind. **3**: 73, 1880. = *Neanotis montholoni* (Hook. f.) W. H. Lewis.

Anotis nummularia (Arn.) Hook. f., Fl. Brit. Ind. **3**: 75, 1880. = *Neanotis nummularia* (Arn.) W. H. Lewis.

Anotis nummulariformis (Arn.) Trimen, Syst. Cat. 42, 1885. = *Neanotis nummulariformis* (Arn.) W. H. Lewis.

Anotis oxyphylla (G. Don) Hook. f., Fl. Brit. Ind. **3**: 72, 1880. = *Neanotis oxyphylla* (G. Don) W. H. Lewis.

Anotis papuana Lauterb. in K. Sch. & Lauterb., Nachtr. Fl. Deutsch Südsee 391, 1905. = *Neanotis hirsuta* (L. f.) W. H. Lewis.

Anotis pilifera Schlecht., Linnaea **28**: 487, 1856. = *Arcytophyllum filiforme* (Ruiz & Pav.) Standl., Field Mus. Nat. Hist., Bot. Ser., **11**: 183, 1936.

Anotis prainiana W. A. Talbot, Jour. Bombay Nat. Hist. Soc. **11**: 237, 1897. = *Neanotis prainiana* (W. A. Talbot) W. H. Lewis.

Anotis pterospora (F. Muell.) K. Sch. in Engler & Prantl, Nat. Pflanzenfam. IV. **4**: 27, 1891. = *Hedyotis pterospora* F. Muell., Fragm. **4**: 40, 1863.

Anotis purpurea (L.) G. Don, Gen. Syst. Gard. Bot. **3**: 535, 1834. = *Hedyotis purpurea* (L.) Torrey & Gray, Fl. N. Amer. **2**: 40, 1841.

Anotis quadrilocularis (Thw.) Hook. f., Fl. Brit. Ind. **3**: 74, 1880. = *Neanotis quadrilocularis* (Thw.) W. H. Lewis.

Anotis repens K. Sch. in Engler & Prantl, Nat. Pflanzenfam. IV. **4**: 22, fig. 8H, 1891, in error for *A. serpens* (H.B.K.) DC.

Anotis rheedei (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 73, 1880. = *Neanotis rheedei* (Wall. ex Wight & Arn.) W. H. Lewis.

Anotis richardiana (Arn.) Hook. f., Fl. Brit. Ind. **3**: 75, 1880. = *Neanotis richardiana* (Arn.) W. H. Lewis.

Anotis ritchiei Hook. f., Fl. Brit. Ind. **3**: 74, 1880. = *Neanotis ritchiei* (Hook. f.) W. H. Lewis.

Anotis rotundifolia (Michx.) DC., Prodr. **4**: 433, 1830. = *Hedyotis procumbens* (Gmel.) Fosb., Castanea **19**: 32, 1954.

Anotis salzmanni DC., Prodr. **4**: 433, 1830. = *Hedyotis salzmannii* (DC.) Steudel, Nom. Bot., ed. 2, **1**: 728, 1841. [*Hedyotis muscosa* St.-Hil., Voy. int. Brésil, Partie 2, Tom **1**: 396, 1833; *H. thesiifolia* St.-Hil., loc. cit. 397; *H. perpusilla* Hook. & Arn., Hook. Bot. Misc. **3**: 359, 1833; *H. pilosa* Poepp. & Endl., Nov. Gen. Sp. Pl. **3**: 30, t. 235, 1844; *Oldenlandia thesiifolia* (St.-Hil.) K. Sch. in Mart., Fl. Bras. **6**(6): 269, 1889; *Hedyotis dasycarpa* O. Ktze. ex K. Sch., loc. cit. 270, nom. nud. pro syn.; *H. palustris* Casar. ex K. Sch., loc. cit., nom. nud. pro syn.; *Oldenlandia salzmanni*, nom. illegit., Index Kewensis **2**: 336, 1895.]

Anotis scleranthoides (F. Muell.) Domin, Biblioth. Bot. **22**(89): 1170, 1929. = *Hedyotis scleranthoides* F. Muell., Fragm. **4**: 39, 1863.

Anotis serpens (H. B. K.) DC., Prodr. **4**: 433, 1830. = *Arcytophyllum microphyllum* (Willd. ex Roem. & Schult.) Standl., Field Mus. Nat. Hist., Bot. Ser., **7**: 207, 1931. [*Houstonia microphylla* Willd. ex Roem. & Schult. in L., Syst. Veg., ed. 15, **3**: 527, 1818, non *Hedyotis microphylla* Willd. ex Roem. & Schult. in L. (loc. cit. 526), nec *Oldenlandia microphylla* De Wild. & Th. Dur. (Ann. Mus. Congo, sér. 2, **2**: 28, 1900); *Hedyotis serpens* H. B. K., Nov. Gen. Sp. Pl. **3**: 390, t. 289, 1820.]

Anotis serpyllifolia (Michx.) G. Don, Gen. Syst. Gard. Bot. **3**: 535, 1834. = *Hedyotis michauxii* Fosb., Amer. Midl. Nat. **29**: 786, 1943.

Anotis setosa (Ruiz & Pav.) DC., Prodr. **4**: 432, 1830. = *Arcytophyllum setosum* (Ruiz & Pav.) Schlecht., Linnaea **28**: 489, 1856.

Anotis tenella (Pursh) G. Don, Gen. Syst. Gard. Bot. **3**: 535, 1834. = *Hedyotis michauxii* Fosb., Amer. Midl. Nat. **29**: 786, 1943.

Anotis teysmanniana, nom. illegit. (cf. footnote 4); *Oldenlandia teysmanniana* Miq., Fl. Ind. Bat. **2**: 354, 1857. = *Neanotis wightiana* (Wall. ex Wight & Arn.) W. H. Lewis.

Anotis thwaitesiana (Hance) Maxim., Bull. Acad. Imp. Sc. St. Pétersb. **29**: 165, 1883. = *Neanotis thwaitesiana* (Hance) W. H. Lewis.

Anotis thymifolia (Ruiz & Pav.) DC., Prodr. **4**: 432, 1830. = *Arcytophyllum thymifolium* (Ruiz & Pav.) Standl., Field Mus. Nat. Hist., Bot. Ser., **7**: 208, 1931.

Anotis trachymenoides (F. Muell.) Domin, Biblioth. Bot. **22**(89): 1170, 1929.
= *Hedyotis trachymenoides* F. Muell., Fragm. **4**: 39, 1863.

Anotis trimera Craib, Fl. Siam. Enum. **2**: 59, 1932. = *Neanotis trimera* (Craib) W. H. Lewis.

Anotis urophylla (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 72, 1880.
= *Neanotis urophylla* (Wall. ex Wight & Arn.) W. H. Lewis.

Anotis wightiana (Wall. ex Wight & Arn.) Hook. f., Fl. Brit. Ind. **3**: 75, 1880.
= *Neanotis wightiana* (Wall. ex Wight & Arn.) W. H. Lewis.

LITERATURE CITED

- BREMEKAMP, C. E. B. 1952. The African species of *Oldenlandia* L. sensu Hiern et K. Schumann. Verh. Kon. Nederl. Akad. Wet., Afd. Natuurk., sect. 2, **48**: 1-297.
- CANDOLLE, A. P., DE. 1830. *Anotis*, p. 431-433, In *Prodromus systematis naturalis regni vegetabilis*. Vol. 4.
- CRAIB, W. G. 1932. *Anotis*, p. 59, In *Florae Siamensis enumeratio*. Vol. 2.
- ERDTMAN, G. 1952. Pollen morphology and plant taxonomy. Angiosperms. Almqvist and Wiksell, Stockholm.
- HAYATA, B. 1920. *Anotis*, p. 54, In *Icones plantarum Formosanarum*. Vol. 9.
- HOOKE, J. D. 1873. *Hedyotideae*, p. 53-64, In BENTHAM & HOOKE, *Genera plantarum*. Vol. 2.
- . 1880. *Hedyotis*, *Oldenlandia*, & *Anotis*, p. 49-76, In *Flora of British India*. Vol. 3.
- HUTCHINSON, J. 1916. *Anotis longiflora*, In V.—Decades Kewenses. Kew Bull. **1916**: 35.
- LEWIS, W. H. 1965a. Cytopalynological study of African *Hedyotideae* (*Rubiaceae*). Ann. Missouri Bot. Gard. **52**: 182-211.
- . 1965b. Pollen morphology and evolution in *Hedyotis* subgenus *Edrisia* (*Rubiaceae*). Amer. Jour. Bot. **52**: 257-264.
- MERRILL, E. D. & F. P. METCALF. 1937. New Kwangtung plants. Lingnan Sci. Jour. **16**: 167-180.
- SCHUMANN, K. 1891. *Anotis*, p. 27, In ENGLER & PRANTL, *Nat. Pflanzenfam*. IV. **4**.

APPENDIX 1

Palynological Procedures and Materials

Whole flowers or mature buds were removed from herbarium specimens and acetolyzed according to the procedure outlined by Erdtman (1952). Some collections were also chlorinated before being mounted in glycerin jelly and sealed with paraffin. A complete set of slides is maintained at the Missouri Botanical Garden (MO) and duplicates of those from which material was received from other herbaria (BRIU, GH, K, L, S, SING, US) will be filed with these institutions.

The species of *Hedyotis* from Asia and Australia and of *Neanotis* studied are listed alphabetically below together with the collector and number, herbarium where specimen is filed, and the country of origin. An attempt has been made to examine pollen from a wide range of morphologically diverse species in each genus. For the large genus *Hedyotis* the following taxa are represented: *H.* sect. *Anotidopsis* Hook. f. (pro parte *Hedyotis*), *H.* sect. *Dimetia* Wight & Arn., *H.* sect. *Diplophragma* Wight & Arn., *H.* sect. *Hedyotis*, *H.* sect. *Involucrella* Hook. f., and *H.* sect. *Leptopetalum* (Hook & Arn.) Hook. f. as well as a few species of *H.* subg. *Oldenlandia* (L.) Torrey & Gray or *Oldenlandia* s.s.



Lewis, Walter H. 1966. "The Asian Genus *Neanotis* Nomen Novum (*Anotis*) and Allied Taxa in the Americas (Rubiaceae)." *Annals of the Missouri Botanical Garden* 53, 32–46. <https://doi.org/10.2307/2394973>.

View This Item Online: <https://www.biodiversitylibrary.org/item/65867>

DOI: <https://doi.org/10.2307/2394973>

Permalink: <https://www.biodiversitylibrary.org/partpdf/4238>

Holding Institution

Missouri Botanical Garden, Peter H. Raven Library

Sponsored by

Missouri Botanical Garden

Copyright & Reuse

Copyright Status: In copyright. Digitized with the permission of the rights holder.

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.