A reappraisal of *Ilex aquifolium* and *I. perado* (*Aquifoliaceae*)

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Summary. The taxa within the *Ilex aquifolium* – *I. perado* complex are revised and their interrelationships discussed. Two new combinations are published: *I. perado* var. *lopezlilloi* (Kunkel) S. Andrews and *I. perado* subsp. *iberica* (Loes.) S. Andrews.

The genus *Ilex* L. (*Aquifoliaceae*) consists of over 400 species and is widely distributed in the tropical, subtropical and temperate zones of the world. Four subgenera are recognised; *Ilex aquifolium* L. and *I. perado* Ait. belong to subgenus *Ilex*, section *Ilex*. *I. aquifolium* has been chosen as the type of the genus *Ilex*; see Hitchcock & Green (1929: 126–127).

I. aquifolium occurs in South & West Europe, West Asia and North Africa. It is hardy up to 62°N (Godwin (1956: 175) and is widely cultivated in temperate regions. *I. perado* occurs in the North Atlantic Islands (the Canary Islands, Madeira and the Azores) and on the Iberian Peninsula. It is a tender species and its taxa in cultivation usually require greenhouse protection in the British Isles.

Much confusion has existed in the past between these two closely related species as earlier authorities dealt only with particular regional or island groups. No one since Loesener (1901: 244–262) has carried out an overall investigation and even then several of his taxa are very misleading as a result of his tendency for splitting. He examined only herbarium material but during my research I felt it was also essential to look at the natural variation of *I. perado* in the wild. In the spring of 1982, I spent four weeks on the Canary Islands, Madeira and the Azores where I studied the populations of *I. perado* and examined their various morphological features. Grateful thanks are due to Mr G. E. Maul on Madeira, Dr A. Santos Guerra and Señor M. Fernández Galván on Tenerife and Gomera and Dr N. de Sousa on São Miguel (Azores) among others. I am indebted to the Holly Society of America and the International Dendrology Society for helping me to fund this trip.

MORPHOLOGICAL COMPARISON OF I. AQUIFOLIUM AND I. PERADO

I. perado generally has winged petioles (best seen on dried specimens) while *I. aquifolium* rarely has, and this provides one of the best specific distinctions. The main exception is *I. perado* var. *platyphylla* where about 40% of the specimens seen do not have wings. The type-gathering of *I. perado* subsp. *iberica* had some leaves with and some without winged petioles. It is very rare for *I. aquifolium* to have wings: the only specimens seen were 2 gatherings from the Paris Botanic Garden and *Mattfeld* 2606 (K!) from Greece.

The size, shape and margin of the leaves are in general characteristic for the main taxa (Fig. 1) as indicated in the key p. 143. The three main subspecies of *I. perado*, subsp. *platyphylla* on Tenerife and Gomera, subsp.

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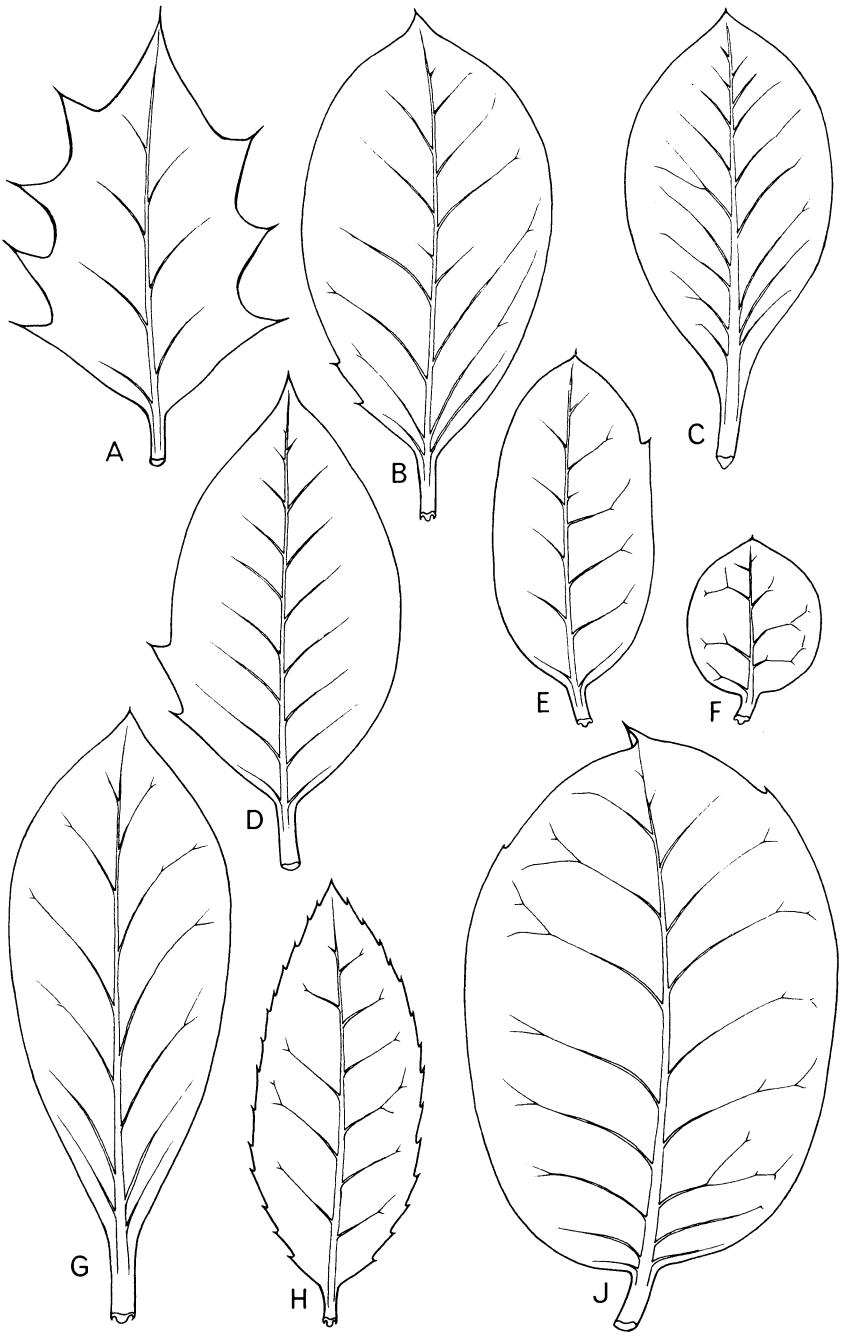


FIG. 1. Leaf-shapes in *Ilex aquifolium* and *Ilex perado*, all × ⅔. **A** *I. aquifolium* from *M.J.D.* s.n. (1870). **B** *I. perado* subsp. *perado* from *S. Andrews* 434. **C** *I. perado* subsp. *iberica* from *Reverchon* 76. **D** *I. aquifolium* from Herb. *A. N. Desvaux* 5. **E** *I. perado* subsp. *azorica* from *Trelease* 182. **F** *I. perado* subsp. *azorica* from *Carteolo da Paiva* s.n. **G** *I. perado* subsp. *platyphylla* var. *lopezlilloi* from *Kunkel* 18674. **H** *I. perado* subsp. *perado* from *Mason* 343. **J** *I. perado* subsp. *platyphylla* var. *platyphylla* from *Bourgeau* 72. Drawn by Eleanor Huxley.

perado on Madeira, and subsp. *azorica* in the Azores, have progressively smaller and rounder leaves. The variation in size is continuous, but there is relatively little overlap in the dimensions of mature leaves under average conditions. In Fig. 2 the open symbols represent seedling or sucker growth, while the large overlap of subsp. *azorica* with subsp. *perado* represents specimens which were collected in lush cultivated vegetation. The mature leaves of subsp. *perado* can normally be distinguished from subsp. *azorica* by the more obovate (less round) to elliptic shape. The distinction between subsp. *perado* and subsp. *platyphylla* is less easy, but in general subsp. *platyphylla* can be distinguished by its broader leaf-shape and longer spines.

The flowers of *I. aquifolium* and *I. perado* are basically very similar and 4-merous almost without exception (see below). It is difficult, however, to make any detailed comparison because relatively little flowering material is available within the *I. perado* complex.

The calyx and corolla seem to show no marked difference between ♂ and ♀ in either species. The calyx of *I. perado* tends to be larger than in *I. aquifolium* except for *I. perado* subsp. *azorica*. The calyx is pubescent in all taxa except *I. perado* subsp. *perado* and occasionally subsp. *azorica*, but the lobes are always ciliate.

I. perado var. *lopezlilloi* has the largest corolla and subsp. *azorica* the smallest. The corolla lobes are normally ciliate in the upper ⅓ only, the exceptions being in *I. perado* (subsp. *perado*, var. *lopezlilloi* and occasionally subsp. *azorica* which have only sporadic cilia).

There are four stamens, occasionally five in *I. perado* subsp. *azorica*. The filaments and anthers are largest (4·5 mm and 2·2 mm) in *I. aquifolium* and smallest (0·8 mm and 0·8 mm) in *I. perado* subsp. *azorica*.

The staminodes are largest (4·5 mm) in *I. perado* var. *platyphylla* and smallest (1 mm) in *I. aquifolium*. The characteristic stigma in ♀ flowers is 0·5–1·3 mm wide in *I. aquifolium* but reaches up to 2·5 mm in *I. perado*.

The four ovaries do not noticeably change in shape throughout the taxa, being urn-shaped and normally 1·5–3 mm long but in subsp. *platyphylla* up to 4 mm. In the ♂ flowers the pistillode is largest (2 mm) in subsp. *perado* and smallest (0.5 mm) in subsp. *azorica*.

The length of the fruiting pedicels provides, in general, a useful distinction between the two specimens being 3–8(–12) mm in *I. aquifolium* and (4–)6–16 (–27) mm in *I. perado*. The fruiting specimens of *I. perado* var. *lopezlilloi* had some pedicels up to 27 mm and one unlabelled specimen of subsp. *azorica* seen at Ponta Delgada had pedicels up to 20 mm, in contrast to the other taxa of *I. perado* with a length of no more than 16 mm. There is some variation in the indumentum, and glabrous pedicels occur sporadically.

Both species have red spherical berries. Those of *I. perado* when immature often seem to be more obovate especially in cultivation, and when ripe are slightly larger than those of *I. aquifolium*; they have (3–)4(–5) pyrenes while *I. aquifolium* has (2–)4 pyrenes which are slightly smaller.

The shape of the cross-sections and the number of ridges on the upperside of the pyrenes are useful characters to distinguish other species, (Hume 1959:1–16) but they cannot be used to distinguish the two closely related species considered here.

Key to taxa in the Ilex aquifolium/perado complex

1. Petioles rarely winged; margin of lamina often spiny; spines (1–)2·5–

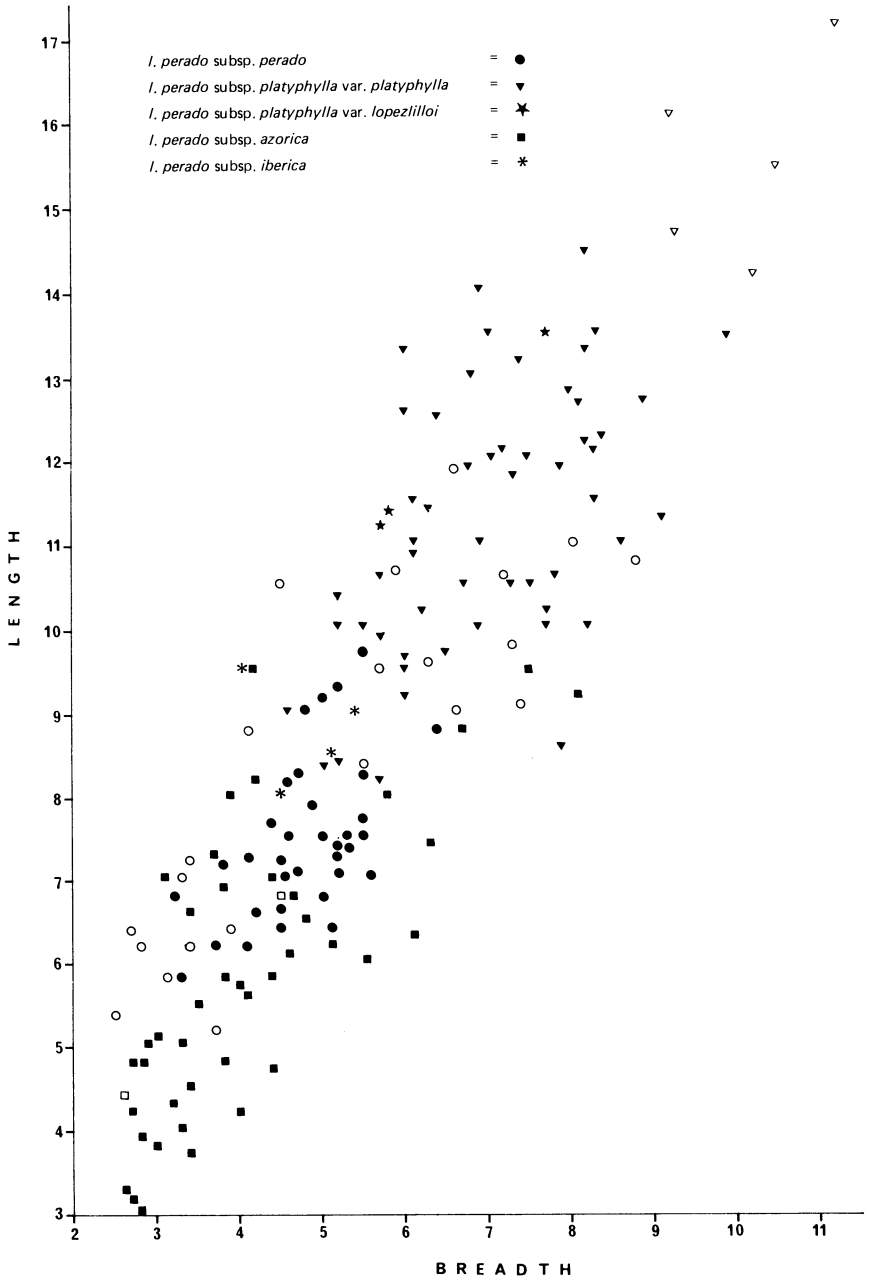


FIG. 2. Scatter diagram showing relationship between length and breadth of leaves in the infraspecific categories of *I. perado*. Open symbols represent sucker or seedling growth.

11 mm, divaricating or occasionally forward-pointing. Mature lamina usually elliptic or ovate, rarely orbicular ..... **1. aquifolium**

1. Petioles usually winged; margin of mature lamina often entire; spines when present forward-pointing or adpressed: (**2. perado**);

2. Margin of lamina spiny; spines (1–)1·5–2 mm, closely spaced, adpressed; lamina elliptic .... **2a.** subsp. **perado** (seedling or sucker growth)
2. Margin of lamina often entire; spines when present, 0·5–3·5(–4·5) mm, forward-pointing or adpressed; mature lamina obovate, oblong, oblong-ovate, ovate or orbicular:
3. Fruiting pedicels (10–)18–27 mm. Mature lamina 11·2(–13·5)× 5·7(–7·7) cm, elliptic-oblong; spineless (Gomera) .. **2b.** var. **ii. lopezlilloi**
3. Fruiting pedicels 3–16(–20) mm:
4. Margin of mature lamina sometimes spiny; spines (0·8–)1·5–3·5 (–4·5) mm; mature lamina (8·2–)10–13·2(–17·5) × (5–)6–8·6 (–11) cm, usually broadly ovate, obovate or oblong, rarely elliptic; petioles sometimes winged (Tenerife, Gomera) ..... **2b.** var. **i. platyphylla**
4. Margin of mature lamina often entire; spines 0·5–1·8 mm; mature lamina 3–6·6(–9·5) × 2·5–5(–8·1) cm, orbicular, ovate or oblong, petioles winged (Azores) ..... **2c.** subsp. **azorica**
4. Margin of mature lamina often entire, spines 0·5–1·5(–2) mm; mature lamina 6·2–9·7(–10·5) × (3·2–)4–5·6(–6·4) cm, obovate, oblong-ovate, ovate, oblong, rarely orbicular or elliptic:
5. Petioles winged, 0·7–1·7 cm, often glabrous (Madeira) .... **2a.** subsp. **perado**
5. Petioles sometimes winged, 1—2·4 cm, pubescent (Iberian Peninsula) ..... **2d.** subsp. **iberica**

1. Ilex aquifolium L., Sp. Pl.: 125 (1753); Lam., Encycl. Méth. Bot. 3: 145 (1789); Willd., Sp. Pl. 1: 707 (1797); DC., Prodr. 2: 13 (1825); Bonnet & Barratte, Cat. Pl. Vasc. Tunisie: 97 (1896); Battandier, Fl. d'Algérie 1: 188 (1899); Loes., Monogr. Aquifol. 1: 261 (1901); Jahandiez & Marie, Cat. Pl. Maroc 2: 473 (1932); Yaltirik in Fl. Turkey 2: 541 (1966); Peterken & Lloyd in J. Ecol. 55: 841 (1967); Webb in Fl. Europaea 2: 241 (1968); Bonafe, Fl. Mallorca 3: 147 (1979) and in many national floras. Described from Europe.

Aquifolium Haller, Enum. Pl. Hort. Reg. Götting.: 198 (April 1753).
Aquifolium ilex Scop., Fl. Carniol. ed. 2, 1: 116 (1772). Type as for *I. aquifolium* L.
Ilex aquifolium var. *vulgaris* Ait., Hort. Kew.: 169 (1789) *nom. inval.* Type as for *I. aquifolium* L.
I. aquifolium var. *heterophylla* Ait., Hort. Kew. 1: 169 (1789). Type not traced.
Aquifolium spinosum Gaertn., Fruct. 2: 72, tab. 92 (1791). Type: ? TUB not seen.
I. sempervirens Salisb., Prodr.: 70 (1796) *nom. illegit.* Based on *I. aquifolium* L.
I. balearica Desf., Hist. Arb. Arbriss. 2: 362 (1809). Type not seen, cultivated specimen presumably with Desf. spms in FI.
I. vulgaris Gray, Nat. Arr. Brit. Pl. 2: 491 (1821) *nom. illegit.* Based on *I. aquifolium* L.
I. aquifolium var. *integrifolia* Lange, Haandb. Dansk, Fl. 3 ed.: 127 (1864). Type not seen, not found in C.
I. aquifolium var. *occidentalis* Loes., Monogr. Aquifol. 1: 257 (1901) *nom. illegit.* for var. *aquifolium*.
I. aquifolium var. *occidentalis* Loes. forma *heterophylla* (Ait.) Loes., Monogr. Aquifol. 1: 260 (1901).

I. aquifolium var. *occidentalis* Loes. forma *balearica* Loes., Monogr. Aquifol. 1: 261 (1901). Based on *I. aquifolium* L. var. 'α' Lam., Encycl. Méth. Bot. 3: 145 (1789). Type: P-LAM.!

I. aquifolium var. *occidentalis* Loes. forma *vulgaris* (Ait.) Loes., Monogr. Aquifol. 1: 258 (1901).

I. aquifolium var. *occidentalis* Loes. forma *arbutifolia* Loes., Monogr. Aquifol. 1: 261 (1901). Type: Sicily, *Citarda* 745 p.p. (lectotype K! chosen here; isolectotypes BM!, P!, A!; annotated var. *arbutifolia* Todaro).

I. aquifolium var. *algarviensis* Chodat, Excurs. Botan. Espagne & Portugal: 81 (1909). Type: G not seen.

I. aquifolium var. *occidentalis* Loes. forma *heterophylla* (Ait.) Loes. subforma *algarviensis* (Chodat) Loes. in Mitt. Deutsch. Dendrol. Gesell. 28: 29 (1919).

I. aquifolium var. *barcinonae* Pau in Mem. Museu Ciències Nat. Barcelona 1: 32 (1922). Type not traced.

I. aquifolium var. *laetevirens* Sennen, Plantes D'Espagne: 74 (1926). Type: Spain, *Sennen* 4722 (holotype BCF; isotype BM!).

I. montserratense Sennen, Plantes D'Espagne: 73 (1926). Type: Spain, *Sennen* 2581 (holotype BCF; isotype BM!).

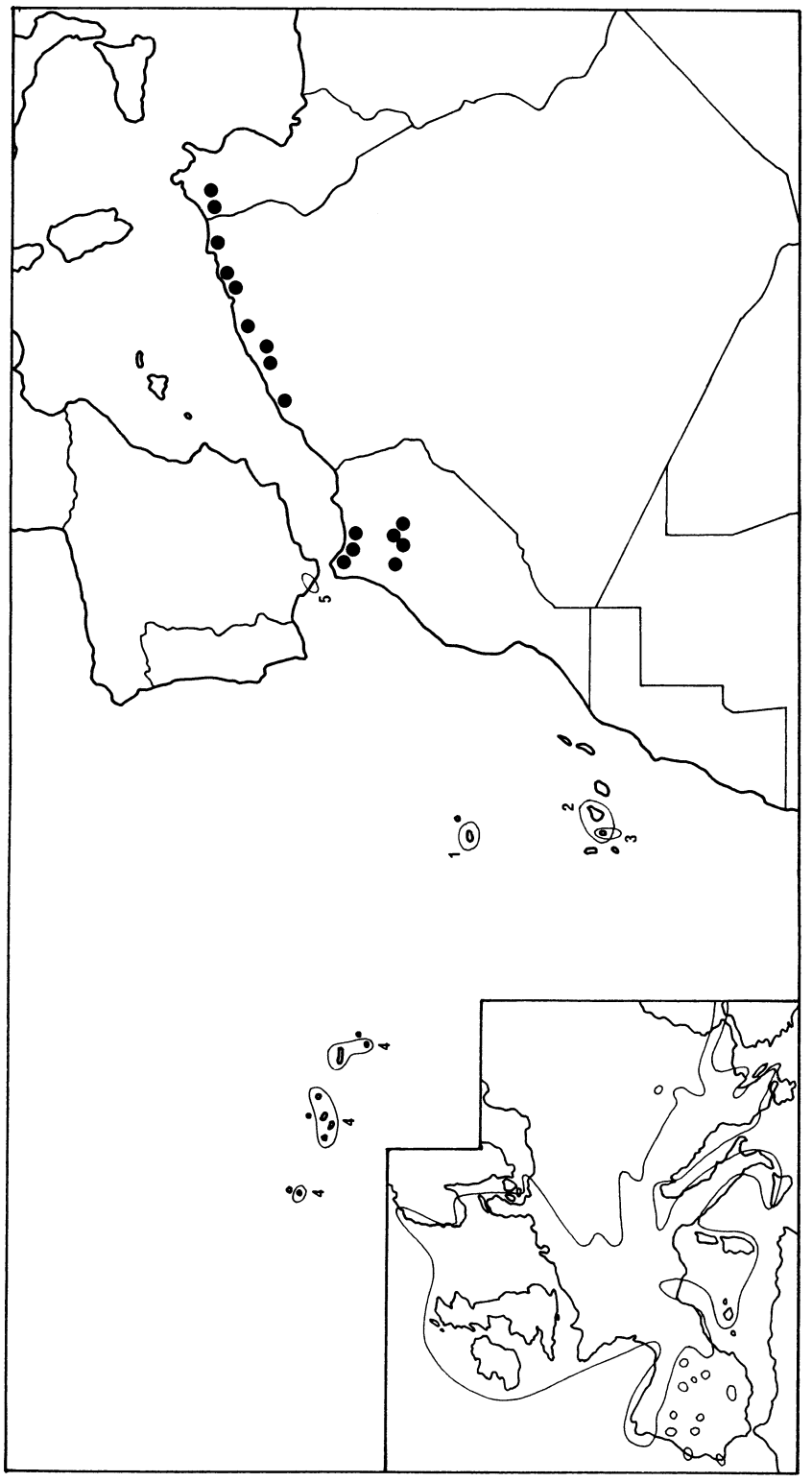
Evergreen shrub to tree up to 25 m. Bark silver grey. Branches glabrous, although often pubescent when young. *Leaves*: petioles 0·5–1·6 cm, usually pubescent, rarely winged; lamina (1·5–)5·5–9·5 × (2–)3–6 cm, usually elliptic or ovate, undulate and often spiny or partly spiny at the margin; spines (1–)2·5–11 mm, divaricating or occasionally forward-pointing. *Flowers* 4-merous: borne on second-year wood, few-flowered in axillary fascicles; calyx 1–2 mm long, pubescent, lobes 0·3–1·3 × 1–1·8 mm, ciliate; corolla (2·5–)3·5–5·5(–6) mm long, lobes (2–)3·5–5·5 × 2–4 mm, joined in lower ⅓ or occasionally free, ciliate in upper ⅓; stamens 4(–5), filament (1–)2–3(–4·5) mm, anther 0·9–2·2 mm; staminodes 1–2·8 mm; ovary 2–3 mm long, 4-lobed, subglobose to subovoid; stigma 0·5–1·3 × 1–1·4 mm, undulate-capitate, pistillode 0·7–1·3 mm long. *Fruits*: 6–9(–11) mm diam., red, spherical; pyrenes (2–)4, ovoid, (5–)6–8 × 3–4(–5) mm, surfaces ridged; pedicels 3–8(–12) mm, usually pubescent.

S & W Europe to S W Scandinavia, Turkey, NW Africa. Map 1.

In the past, Loesener and other authorities divided *I. aquifolium* into several subtaxa, including var. *occidentalis* Loes. and its forms *arbutifolia* Loes., *balearica* Loes., *heterophylla* (Ait.) Loes. and *vulgaris* (Ait.) Loes.

Forma *arbutifolia* Loes. was based on specimens collected by Citarda in Sicily and distributed with the name *I. aquifolium* L. var. *arbutifolia* Todaro. The specimens which Loesener described at Berlin had non-spiny leaves, while 'duplicates' were distributed with both spiny and non-spiny leaves. Since the holotype had non-spiny leaves and has been destroyed, I designate the Kew duplicate as lectotype and the duplicates in BM, A and P as isolectotypes. I suspect that the spiny-leaved specimens in PAL and PH are from a different plant; however, they fall within the morphological range of *I. aquifolium* and presumably are not type material.

Forma *balearica* was considered to be confined to the Iberian Peninsula and the Balearic Islands. This ovate-leaved, often non-spiny variant is however



MAP 1. Distribution of *Ilex aquifolium* and *Ilex perado* (insert: *I. aquifolium* in Europe, after Meusel 1943). ● *I. aquifolium* in North Africa; **1** *I. perado* subsp. *perado*; **2** *I. perado* subsp. *platyphylla* var. *lopezlilloi*; **4** *I. perado* subsp. *azorica*; **5** *I. perado* subsp. *iberica*. Drawn by Eleanor Huxley.

widespread throughout the Mediterranean, where it intergrades with the spiny-leaved *I. aquifolium* which is the f. *vulgaris* of Loesener.

A holly with elliptic, spiny and non-spiny leaves on the same plant was considered distinct enough to be called f. *heterophylla*, but as this variant occurs throughout the distribution of *I. aquifolium* it cannot be treated as a separate entity.

According to Loesener, the following name is included in his synonymy for *I. aquifolium*; var. *senescens* Roem. & Schult. (1818:486). I have not seen the type and thus have been unable to verify it.

Sennen (1917:93) described *Ilex montserratense* Sennen as having 'some climbing spreading stems'! No further notes are available on the habit but the type specimen is undoubtedly *I. aquifolium*. In 1926 he described *I. aquifolium* var. *laetevirens* Sennen as a holly with bright green leaves but the type gathering is in my judgement typical *I. aquifolium*.

Chodat (1909:82) distinguished *I. aquifolium* var. *algarviensis* Chodat on account of its long, unwinged petioles. Loesener (1919:28) reduced this to sub-forma. From Chodat's description it appears that this taxon is no different from several other specimens of *I. aquifolium* in the Mediterranean.

Pau (1922:32) recognised *I. aquifolium* var. *barcinonae* Pau on account of the oblong fruit and longer petioles. The petioles of *I. aquifolium* vary in length, and because there is no mention in Pau's description of a winged petiole, which is one of the main distinctions between the two species, I have sunk var. *barcinonae* here.

Variety *integrifolia* Lange is used by Nolte in ms. on Hans. Herb. Schlesw.-Holst. no. 6286 (not seen). This name was validly published by Lange in 1864. The type has not been found at Copenhagen (C) but *Lange* s.n. (K!) may possibly be an isotype.

Variety *apennina* is used by Lacaita in ms. on *Lacaita* no. 177 (BM!). No account of this name has been traced in the literature.

It becomes increasingly obvious that *I. aquifolium* is much more diverse in the Mediterranean area than in western Europe. In the former, the leaves are ovate to elliptic, rarely orbicular, and spiny to non-spiny with petioles of various lengths. In western Europe, the elliptic, rarely ovate, leaves tend to be more undulate and longer-spined than in the south, also the petioles are shorter. The common spiny holly of western Europe merges with the other hollies mentioned above and therefore I have found it impossible to distinguish any infraspecific taxa of *I. aquifolium*.

I had noticed several spiny and non-spiny broad-leaved hollies occurring within the geographical range of *I. aquifolium* and it occurred to me that these might include an element of *I. perado*. On closer investigation of their petioles and other characters, some were found to be true *I. aquifolium* while others I was unable to place and these are to be found in the note on excluded specimens at the end of this paper.

2. Ilex perado *Ait.*, Hort. Kew. 1: 169 (1789); Lowe, Man. Fl. Madeira 2, 1: 15 (1868); Loes., Monogr. Aquifol. 1: 244 (1901); Azevedo de Menezes, Fl. Archipel. Madeira: 37 (1914); Tutin in Journ. Bot. 71: 99 (1933); Grabham, Plants seen in Madeira: 96 (1934); Webb in Fl. Europaea 2: 241 (1968); Lems in Amer. Hort. Mag. 47, 3: 290 (1968); Eriksson *et al.*, Fl. Macronesia Checkl. Vasc. Pl.: 7 (1974); Kunkel in Cuad. Bot. Canar. 28: 17 (1977);

Andrews in Holly Letter, in press; Andrews in Internat. Dendrol. Soc. Yearbook 1982: 69 (1983). Type: Hort. Kew (holotype BM!).

Evergreen shrub to tree up to 15 m. Branches glabrous, sometimes pubescent when young. *Leaves*: petioles 0·3–2·4 cm, glabrous to pubescent, usually winged, lamina 3–17·5 × 2·5–11 cm, obovate, oblong, oblong-ovate, ovate, orbicular or elliptic, flat, often without spines at the margins; spines 0·5–4·5 mm, forward-pointing or adpressed. *Flowers* 4-merous: borne on second-year wood, few to many in axillary fascicles; calyx 0·8–2·5 mm long, often pubescent, lobes 0·3–2 × 0·5–3 mm, ciliate; corolla 2·5–6·3 mm long, lobes 2·3–5·8 × 2–4·3 mm, joined in lower ⅓ or occasionally free, often ciliate in upper ⅓; stamens 4(–5), filament 1·5–4 mm, anther 0·8–2·1 mm; staminodes 1·1–4·5 mm; ovary 1·5–4 mm, 4-lobed, subglobose to subovoid; stigma 0·5–2·5 × 0·6–3 mm, pistillode 0·5–2 mm. *Fruits*: 6–11 × 5–10 mm, red, spherical to oblong; pyrenes (3–)4(–5), ovoid 5·8–8·5 × 2·5–5 mm, surfaces ridged; pedicels (3·5–)6–23(–27) mm usually pubescent.

Canary Islands, Madeira, Azores, Iberian Peninsula. Map 1.

Previous workers have dealt with one or other of the geographical groups of this species (Table 1). Only Loesener (1901) pursued a thorough examination but some of his taxa are very confusing e.g. *I. aquifolium* var. *occidentalis* forma *balearica* and *I. perado* var. *iberica* Loes. (see under subsp. *iberica*).

2a. subsp. **perado**; Tutin in Journ. Bot. 71.: 99 (1933); Hansen, Checkl. Vasc. Pl. Archipel. Madeira: 28 (1969); Sjögren, Bolet. Mus. Municip. Funchal 26: 99 (1972); Eriksson *et al.*, Fl. Macronesia Checkl. Vasc. Pl.: 7 (1974); Kunkel in Cuad. Bot. Canar. 28: 23 (1977).

I. maderensis Lam., Encycl. Méth. Bot. 3: 146 (1789), as '*maderiensis*'. Type: collector unknown, P-LAM!
I. crassifolia Meerbg., Pl. Sel. Ic. Pict., (text unpaginated) tab. 4 (1798).
I. perado var. *obtusa* DC., Prodr. 2: 14 (1825). Based on Duhamel, Traite des Arbres ed. 2, 1:7, t.2 (1800).
I. microphylla Hort. ex Regel., Suppl. Ind. Sem.: 36 (1866) *nom. inval.* Published in synonymy of *I. perado* var. *obtusa*.
I. perado var. *maderensis* (Lam.) Loes., Monogr. Aquifol. 1: 246 (1901).
I. perado var. *maderensis* subvar. *genuina* Loes., Monogr. Aquifol. 1: 246 (1901) *nom. inval.*
I. perado var. *maderensis* subvar. *spinulosa-serrata* Loes., Monogr. Aquifol. 1: 247 (1901). Type: Madeira, *Mason* 343 (353) (holotype P! isotype G!).

Tree to 5 m. *Leaves*: petioles 0·7–1·7 cm, often glabrous; lamina of seedlings and suckers 5·2–9(–11·9) × 2·6–7(–8·8) cm, elliptic, mature lamina 6·2–8(–9·7) × (3·2–)4–5·6(–6·4) cm, obovate, oblong-ovate, ovate, oblong, rarely orbicular or elliptic, not undulate although sometimes bullate, often without spines; spines 0·5–1·5(–2) mm, forward-pointing, mainly towards the apex. *Flowers*: calyx 1–1·5(–2·2) mm long, lobes 0·5–1·3(–2) × 0·5–2·1(–2·8) mm; corolla 3–5·4 mm long, lobes (2·6–)3–4·5 × 2·5–4·3 mm, practically glabrous, occasionally ciliate; stamens 4, filament 1·8–3·5 mm anther (1·1–)1·5–2·1 mm; staminodes 1·8–2·8 mm, ovary 2–3 mm long; stigma 1–2·5 × 1·5–2·5 mm, pistillode 1–1·5(–2) mm long. *Fruits*: (6–)7·6–10 × (5–)7–10 mm, spherical but often obovate in cultivation, pyrenes 4(–5), (5·8–)6·5–8(–8·5) × 3·4(–4·5) mm; pedicels (3·5–)6·5–12(–16) mm.

TABLE 1. *Ilex perado*: comparison of classifications

Loesener (1901)	Tutin (1933)	Kunkel (1977)	Proposed Arrangement
I. perado	*I. perado*	*I. perado*	*I. perado*
I. perado var. *platyphylla*	*I. perado* subsp. *platyphylla*	*I. platyphylla*	*I. perado* subsp. *platyphylla* *I. perado* subsp. *platypylla* var. *platyphylla*
		I. platyphylla subsp. *lopezlilloi*	*I. perado* subsp. *platyphylla* var. *lopezlilloi*
I. perado var. *maderensis*	*I. perado* subsp. *perado*	*I. perado* subsp. *perado*	*I. perado* subsp. *perado*
I. perado var. *maderensis* subvar. *genuina*			
I. perado var. *maderensis* subvar. *spinulosa-serrata*			
I. perado var. *azorica*	*I. perado* subsp. *azorica*	*I. perado* subsp. *azorica*	*I. perado* subsp. *azorica*
I. perado var. *iberica*			*I. perado subsp. iberica*

MADEIRA

Loesener's description of *I. perado* var. *maderensis* subvar. *spinulosa-serrata* Loes. has been completely overlooked in more recent treatments. Its leaf-shape and in particular the distinctive and closely adpressed spines have caused it to be confused with *Ilex canariensis* Poir., the other native holly of the Atlantic Islands (except the Azores). As the result of my recent field work, it is apparent that this variant represents a seedling and suckering stage of *I. perado* subsp. *perado* and subsp. *azorica*. (I did not see any seedlings of subsp. *platyphylla*).

2b. subsp. **platyphylla** (*Webb & Berth.*) *Tutin* in Journ Bot. 71: 100 (1933); Hansen, Checkl. Vasc. Pl. Archipel. Madeira: 28 (1969); Eriksson, Checkl. Vasc. Pl. Canary Is.: 3 (1971); Eriksson *et al.*, Fl. Macronesia Checkl. Vasc. Pl.: 7 (1974). Type: Tenerife, *Webb* s.n. (holotype FI; isotype P! K!).

I. platyphylla Webb & Berth., Phytogr. Canar. 3, (2): 135 (1842) & tab. 68 (1843); Lowe, Man. Fl. Madeira 2, (1): 16 (1868); Pitard & Proust, Is. Canaries: 147 (1908); Ceballos & Ortuño, Veg. Fl. Forest. Canaries Occident.: 382 (1951); Lems in Sarracenia 5: 14 (1960); Bramwell, Wild Fls. Canary Is.: 159 (1974); Kunkel in Cuad. Bot. Canar. 28: 23 (1977).

I. perado var. *platyphylla* (Webb & Berth.) Loes., Monogr. Aquifol. 1: 246 (1901).

Kunkel in 1977 raised subsp. *platyphylla* back to specific rank, but I do not agree as it is very close to *I. perado*. The main differences are in the size and shape of the leaves and the fact that only some of the petioles are winged. In the same paper Kunkel describes a new subsp. *lopezlilloi* of *I. platyphylla*, which in 1979 Hansen and Sunding transferred to *I. perado*. I prefer to treat it as a variety of that species since var. *lopezlilloi* occurs only on Gomera, which is an island just off Tenerife and var. *platyphylla* is found on both these islands. The main distinction between these two taxa is the length of the fruiting pedicel, which in the former is usually extremely long.

var. i. var. **platyphylla**

Tree to 15 m. *Leaves*: petioles 0·8–1·6 cm, usually pubescent, sometimes winged; lamina of sucker growth up to 17·5 × 11 cm, mature lamina (8·2–) 10–13·2(–14·5) × (5–)6–8·6(–9·9) cm, usually broadly ovate, obovate or oblong, rarely elliptic, flat, sometimes spiny or partly spiny; spines (0·8–) 1·5–3·5(–4·5) mm, forward-pointing. *Flowers*: calyx 1·3–2 mm long, lobes 0·7–1·1 × 1·5–2·2 mm; corolla 4·3–5·7 mm long, lobes 4–5 × 2·6–3·5(–4) mm; stamens 4, filament 2–4 mm, anther 1·3–1·8 mm, staminodes 1·9–4(–4·5) mm; ovary 3–4 mm long; stigma 1·6–2·5 × 0·6–1·4 mm, pistillode 0·9–1·3 mm long. *Fruits:* (7–)8–10(–11) mm diam., spherical; pyrenes 4(–5), (6–)6·5–7·5(–8) × 3–4(–5) mm, pedicels (7–)8–11(–16) mm.

CANARY ISLANDS: TENERIFE, GOMERA, *S. Andrews* 474, 478, 479, 484 (K!), *Sventenius* 5852 (ORT!), *Fernández Galván* 26114, 26685 (ORT!). Map 1.

var. ii. var. **lopezlilloi** *(Kunkel) S. Andrews* stat. nov.

I. platyphylla Webb & Berth. subsp. *lopezlilloi* Kunkel in Cuad. Bot. Canar. 28: 25 (1977). Type: Gomera, *Kunkel* 18613 (holotype G; isotype E!).

I. perado Ait. subsp. *lopezlilloi* (Kunkel) A. Hansen & Sunding, Fl. Macronesia Checkl. Vasc. Pl. ed. 2, 1: 92 (1979).

Branches glabrous. *Leaves*: petioles 1·4–2 cm, usually glabrous always winged; lamina 11·2(–13·5) × 5·7(–7·7) cm, elliptic-oblong, flat, spineless. *Flowers*: (♀ only seen), calyx 2·5 mm long, lobes 1–1·5 × 2·2–3 mm; corolla 6·3 mm long, lobes 5·8 × 4 mm, with occasional cilia near apex, staminodes 4·1 mm; ovary 4 mm long; stigma 2 × 3 mm. *Fruits*: 7–10 mm diam., spherical; pyrenes (3–)4, 6–7 × 2·5–2·8 mm, pedicels (10–)18–23(–27) mm.

CANARY ISLANDS: GOMERA, *Kunkel* 18674 (E!), 18614 (E!), *Andrews* 481 (K!). Map 1.

2c. subsp. **azorica** (*Loes.*) *Tutin* in Journ. Bot. 71: 100 (1933); Franco, Nova Fl. Portugal 1: 432 (1971); Eriksson *et al.*, Fl. Macronesia Checkl. Vasc. Pl.: 7 (1974); Kunkel in Cuad. Bot. Canar. 28: 23 (1977). Type: Pico, *Hochst* 7 (isotypes BM! K!).

I. perado sensu Seubert, Fl. Azorica: 46 (1844); Drouet, Fl. Is. Açores: 82 (1866); Godman, Nat. Hist. Az.: 146 (1870); Palhinha, Cat. Pl. Vasc. Açores: 71 (1966); Silva & Silva, Agron. Lusit. 36, 1: 42 (1974)—non Ait. sensu stricto.

I. perado var. *azorica* Loes., Monogr. Aquifol. 1: 247 (1901).

I. azorica Gand. in Bull. Soc. Bot. France 65: 57 (1918). Type: São Miguel, *Carreiro* 810, 891, 891A (syntypes AZ!), *Thiébaut* 807 (syntype not traced).

I. perado forma *umbrosa* P. Silva & Q. P. Silva in Agron. Lusit. 36: 42 (1974). Type: Pico, *Silva & Silva* 70578 (holotype LISE).

Shrub. *Leaves*: petioles 0·3–0·9(–1·4) cm, usually glabrous, lamina 3–6·6(–9·5) × 2·5–5(–8·1) cm, orbicular, ovate or oblong, flat, often spineless; spines 0·5–1·8 mm, adpressed. *Flowers*: calyx 0·8–1·5 mm long, lobes 0·3–0·8 × (0·5–)1–1·5 mm; corolla 2·5–4·3 mm long, lobes 2·3–3·9 × 2–3 mm, ciliate to almost glabrous in upper ½; stamens 4(–5), filament (0·9–)1·5–2(–3) mm, anther 0·8–1·1 mm; staminodes 1·1–1·9 mm; ovary 1·5–2·5 mm long, stigma 0·5–2·5 × 1·1–2·5 mm, pistillode 0·5–1·1 mm long. *Fruits*: (7–)8–9(–11) × 7–10 mm, spherical, occasionally oblong; pyrenes (3–)4, 6·5–7·5 × 3–4 mm; pedicels 6–11(–20) mm.

AZORES; without further loc., *Watson* 45 (E!); FAIAL, *Nuttal* s.n. (PH!), *B. C. Gonçalves* 4597 (BM!); FLORES, spms. not seen; PICO, *W. M. A. Brooke* 11342 (BM!), *Gonçalves* 1704 (BM!), *B. de Paiva* s.n. (K!); SANTA MARIA, *Gonçalves* 4004 (BM!); SÃO JORGE, *Gonçalves* 25/2/81 (K!); SÃO MIGUEL, *T. C. Hunt* 45 (K!, BM!, P!), *Gonçalves* 4034 p.p. (BM!), 14/2/1981 (K!), *V. & P. Allorge* s.n. (P!), *F. D. Godman*, s.n. (K!), *Trelease* 182 (K!), *H. Drouet* s.n. (BM!), *Carreiro* 378 (AZ!), Furnas, July 1891, ?(AZ!), Agnea de Pao, July 1891, ?(AZ!), sine scheda (AZ!), *Andrews* 508–514, 518, 525, 526A, 527 (K!) & TERCEIRA, *Gonçalves* 15/3/1981 (K!). Map 1.

2d. subsp. **iberica** *(Loes.) S. Andrews* stat. nov.

I. aquifolium sensu auctt. non. L.; Willk. & Lange, Prodr. Fl. Hisp. 3: 478 (1877), as '*β*'; Laguna, Flor. Forest. Españ. 2: 355 (1890), as forma, an *I. balearica.*

I. perado var. *iberica* Loes., Monogr. Aquifol. 1: 247 (1901). Type: Spain, *Reverchon* 76 (isotypes K! P!).

Leaves: petioles 1–2·4 cm, pubescent, sometimes winged; lamina 8–9·5 (–10·5) × 4–5·4 cm, ovate to ovate-oblong, flat, rarely spiny; spines 1 mm. *Flowers*: not seen. *Fruits*: 9–10 mm diam., spherical; pyrenes 4(–5), 8–8·5 × 3·5–4·2 mm; pedicels 9–11 mm.

IBERIAN PENINSULA: SPAIN, PORTUGAL (not seen). Map 1.

Of all the specimens from the Iberian Peninsula that I examined only the type gathering of subsp. *iberica* belongs to *perado*. All the rest were *I. aquifolium*. Although both have similar-shaped leaves, the main difference is in the winged petiole. Loesener's var. *iberica* is here regarded as a subspecies on account of its geographical distribution.

INTERMEDIATE FORMS AND QUESTIONABLE HYBRIDS

Subspecies *perado* occurs only on Madeira but, in 1901, Loesener mentions that var. *platyphylla* can also occur on Madeira where it produces intermediate forms which grade towards subsp. *perado*. I have seen no sign of subsp. *platyphylla* on Madeira but found that subsp. *perado* is extremely variable and one must also take note of seedling and sucker growth. He also mentions that *I. perado* var. *maderensis* (=*I. perado* subsp. *perado*) can occur on Tenerife. In fact subsp. *platyphylla* requires a deep soil in heavy shade while subsp. *perado* tends to grow on the more exposed mountain crests. But very occasionally subsp. *platyphylla* grows near the exposed crests and then the leaves are smaller than is usual e.g. *Riedlé* s.n., *Baudin* s.n. and *Webb* s.n. (all in P!). On my return to Kew, I found that most of my former supposed intermediate specimens belonged, in fact, to the above categories.

Kunkel in 1977 mentions that '*Ilex aquifolium* is cultivated in the Government Arboretum (on Madeira) situated in the laurel forest belt and some curious hybrids are already observed'. While on the island in April 1982, I visited the Garden of the Madeiran Flora (=Government Arboretum) at Ribeiro Frio. It is run by the Serviços Agricolas and was started some 23 years ago. *I. aquifolium* has been growing there for some 15 years but only began fruiting some 5 years ago. I saw three plants of questionable origin. Two (*Andrews* 463, 464) were growing in the indigenous area of the garden and were said to have 'sprung up' about 10 years ago. The third plant (*Andrews* 465) was growing in the cultivated part of the garden and was 7–8 years old. None of the three seedlings have flowered to date. *Lowe* 501, dated 6/5/1826 (BM!) collected on Madeira also appears to belong here. It is difficult at present to say what exactly these plants are as their foliage is unlike any of the *Ilex* × *altaclerensis* (hort. ex Loud.) Dallim. (*I. aquifolium* × *I. perado)* Andrews (1983: 65) clones that I have seen. They are also somewhat different from subsp. *platyphylla* which is found only on Tenerife and Gomera. It is most likely that they are intermediates between subsp. *perado* and subsp. *platyphylla*.

At the Museu Municipal do Funchal, I saw a large-leaved specimen determined as *I. perado* and collected by *Kunkel* s.n. at Ribeiro Frio in 1975. According to Mr G. E. Maul, who had accompanied Kunkel, this specimen came from a tree, not a seedling. Unfortunately we were unable to find the tree in 1982.

EXCLUDED SPECIMENS

According to Bonnet & Barratte (1896: 97), *I. aquifolium* can grow to

'grand proportions' in Tunisia. Two specimens collected by *A. Letourneux* s.n., Oued Baghla (P!) looked unlike any *I. aquifolium* seen from North Africa. Such an extended elliptic lamina is so far unknown in this species. Mrs M. Harley kindly compared the pollen of these specimens with that of *I. perado* and *I. aquifolium* but could find no apparent differences. These specimens appear to represent a distinct variety, but further material is necessary.

The following specimens occur within the geographical range of *I. aquifolium* but they have been excluded from the foregoing account due to a much broader lamina than is usual in *I. aquifolium*. These could possibly include an element of *I. perado* left over from the Pliocene Flora. Fossil leaves of *Ilex* have been found in deposits of the Rhône valley where a laurel forest, existing about 15 million years ago, included *I. canariensis* which belongs to the subgenus *Ilex* section *Cassinoides* Lowe: see Abbé Boulay (1890: 21); G. Depape (1922: 194); K. Lems (1968: 290).

SARDINIA: Nuoro Prov. Parco Comunale, Aritzo, *J. Wood* 439 (K!).

SPAIN: Monserrat, Catalogue, *Fre Sennen* s.n. (BM!).

I. aquifolium L. var. *platyphylloides* Christ, Italy (formerly in Switzerland): Lago Maggiore, Cannobio, (1903) *H. Christ* s.n. (holotype BAS not seen; isotypes A!). Of the two sheets seen, one had extremely large, broad leaves resembling *I. perado* var. *platyphylla* while the other resembled *Ilex* × *altaclerensis*. Christ (1903: 155) has written an account of the *Ilex* in this locality. Loesener described it in (1908: 283) and (1919: 29) reducing it to forma *platyphylloides* (Christ) Loes. See also C. Lacaita in (1922: 125) under *I. aquifolium* L. var. *australis* Lacaita.

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LIST OF EPITHETS

algarviensis	= 1	microphylla	= 2a
apennina	sub 1	montserratense	= 1
aquifolium L.	1	obtusa	= 2a
aquifolium sensu auctt. non L.	= 2d	occidentalis	= 1
arbutifolia	= 1	perado Ait.	2
azorica	2c	perado (subsp.)	2a
balearica	= 1	perado sensu Seubert	= 2c
barcinonae	= 1	platyphylla (subsp.)	2b
crassifolia	= 2a	platyphylla	2b var. i
genuina	= 2a	sempervirens	= 1
heterophylla	= 1	senescens	sub 1
iberica	2d	spinosum	= 1
integrifolia	= 1	spinulosa-serrata	= 2a
laetevirens	= 1	umbrosa	= 2c
lopezlilloi	2b var. ii	vulgaris	= 1
maderensis	= 2a		

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