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THE GENUS *REAUMURIA* IN THE NEAR EAST

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ABSTRACT

R. alternifolia, *R. vermiculata*, *R. hirtella* and *R. negevensis* sp.n., are dealt with taxonomically, ecologically and nomenclaturally.

The genus *Reaumuria* has recently been subject to two revisions: one by Schiman-Czeika, who dealt with Iranian species in Rechinger's Flora Iranica (1964) and the other by Bobrov (1966), dealing with the whole genus. The 11 species recorded by Schiman-Czeika from Iran have been reduced by Bobrov to seven by synonymizing five binomials of the *alternifolia* group with *R. alternifolia* (Labill.) Britten. The present authors, who have seen most of the specimens concerned from Iran, agree with Bobrov in this respect.

The 12 species recorded in Bobrov's revision can be grouped as follows:

1) *Omnino Irano-Turanian*: *R. alternifolia* (Labill.) Britten.

2) *Middle and Central Asian**: *R. kaschgarica* Rupr., *R. songarica* (Pall.) Maxim. and *R. trigyna* Maxim.

3) *Iranian and Middle Asian*: *R. oxiana* (Ledeb.) Boiss., *R. fruticosa* Bge. ex Boiss.

4) *Iranian*: *R. persica* Boiss., *R. kermanensis* Bornm., *R. floyeri* S. Moore, *R. stocksii* Boiss.

5) *Egypto-Palestinian*: *R. vermiculata* L. and *R. palaestina* Boiss.

The last two groups are closely related though separated from one another by a gap of several hundred miles. On the whole, the genus is Irano-Turanian.

The species considered in this article are *R. vermiculata*, *R. hirtella*, *R. negevensis* sp. n. and *R. alternifolia*. The following is a key to the species of Egypt, Palestine and Syria.

1.	Leaves and bracts flat, not succulent.	*R. alternifolia*
—	Leaves and bracts cylindrical or semicylindrical, succulent	2
2.	Leaves, bracts and calyx lobes long-mucronate and sharp-pointed.	*R. vermiculata*
—	Leaves, bracts and sepals obtuse	3

* Middle and Central Asia are two distinct regions. The first comprises mainly the Aralo-Caspian area, the second, Kashgaria, Tibet, Gobi, etc. This distinction is accepted in Soviet plant-geographical literature (Lavrenko and Nikoljskaya, 1963).

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3. Glabrous plants with cylindrical leaves. Calyx lobes with entire margin. *R. negevensis*
— Hirsute or puberulous plants with succulent, flattish or semicylindrical leaves. Calyx lobes with irregularly denticulate margin. *R. hirtella*

Reaumuria alternifolia (Labill.) Britten, J. Bot. 54: 110 (1916); Bobr., Bot. Zhurn. 51: 1068 (1966).

R. hypericoides Willd., Sp. Pl. 2: 1250 (1799). *R. cistoides* Adam in Web. et Mohr, Beitr. Naturk. 1: 61 (1805). *Hypericum alternifolium* Labill., Ic. Pl. Syr. Dec. 2: 17, t. 10 (1791) non Vahl, Symb. Bot. 2: 85, t. 42 (1791). Fig. 1.

LECTOTYPE: In aridis, juxta Syriae desertum, *Labill.* (G).

Palestine: Edom, 13 km W. of Ma'an, 1936, *Eig, Zohary* and *Feinbrun* 512 (HUJ). *Syria*: Syrian Desert, 5–10 km N. of Kuriatein, wadi, 1932, *Eig* and *Zohary* 409 (HUJ).

The above specimens belong to the typical form and agree with Table 10 of Labillardière (1916). We have also seen material from Turkey and Iran which could be assigned to the varieties *latifolia* and *angustifolia* as recorded by Bobrov (1966). But all the above varieties are weakly delimited and can hardly be retained as such.

GENERAL DISTRIBUTION: From Palestine to Kashgaria.

R. alternifolia is very polymorphous. Those who have not seen the entire gamut of varieties may be readily misled in their taxonomical assessment of the individual forms. Indeed, as stated by Bobrov (1966), the polymorphism in this taxon has given rise to the publication of 17 binomials for this species.

R. alternifolia grows in Palestine under more favourable conditions than the other local species of *Reaumuria*.

Reaumuria vermiculata L., Syst. Nat. 10, 2: 1081 (1759) et Sp. Pl. ed. 2: 754 (1762) p.p. excl. cit. Rauwolf et hab. Syria.

R. mucronata Jaub. et Sp., Ill. Pl. Or. 3: 57, t. 245 (1848); Boiss., Fl. Or. 1: 760 (1867).

HOLOTYPE: Herb. Linn. (701/1).

Libya: env. of Tobruk, 1912, *A. Vaccari* 606 (HUJ); a few miles N. of Bugheilan on Azizia Plain, stony hill, *Guichard* KG/LIB/423 (HUJ). *Tunisia*: a few km east of Gafsa, small sandy hills, 1930, *Eig* (HUJ).

R. vermiculata is also recorded from Sinai by Täckholm (Stud. Flora of Egypt, p. 220, 1956). This is probably based on a misnamed specimen of Decaisne. We have looked in vain for specimens of this species in Sinai, in the many excursions undertaken during 1967–1969.

GENERAL DISTRIBUTION: Egypt, Libia, Tunisia, Algeria, Sicily.

Linné, while describing his *R. vermiculata* in Syst. Nat. (1759) gives three citations: Hasselquist, Boccone and Barrielieri. While the latter two are literature references, the citation of Hasselquist concerns the single specimen of *R. vermiculata* in Herb. Linn. No. 701/1, named so by Linné, provided with the sign θ by which Hasselquist's collections are also marked (as for example *Parietaria judaica*) and collected in Alexandria. This is evidenced by the fact that in *Flora*

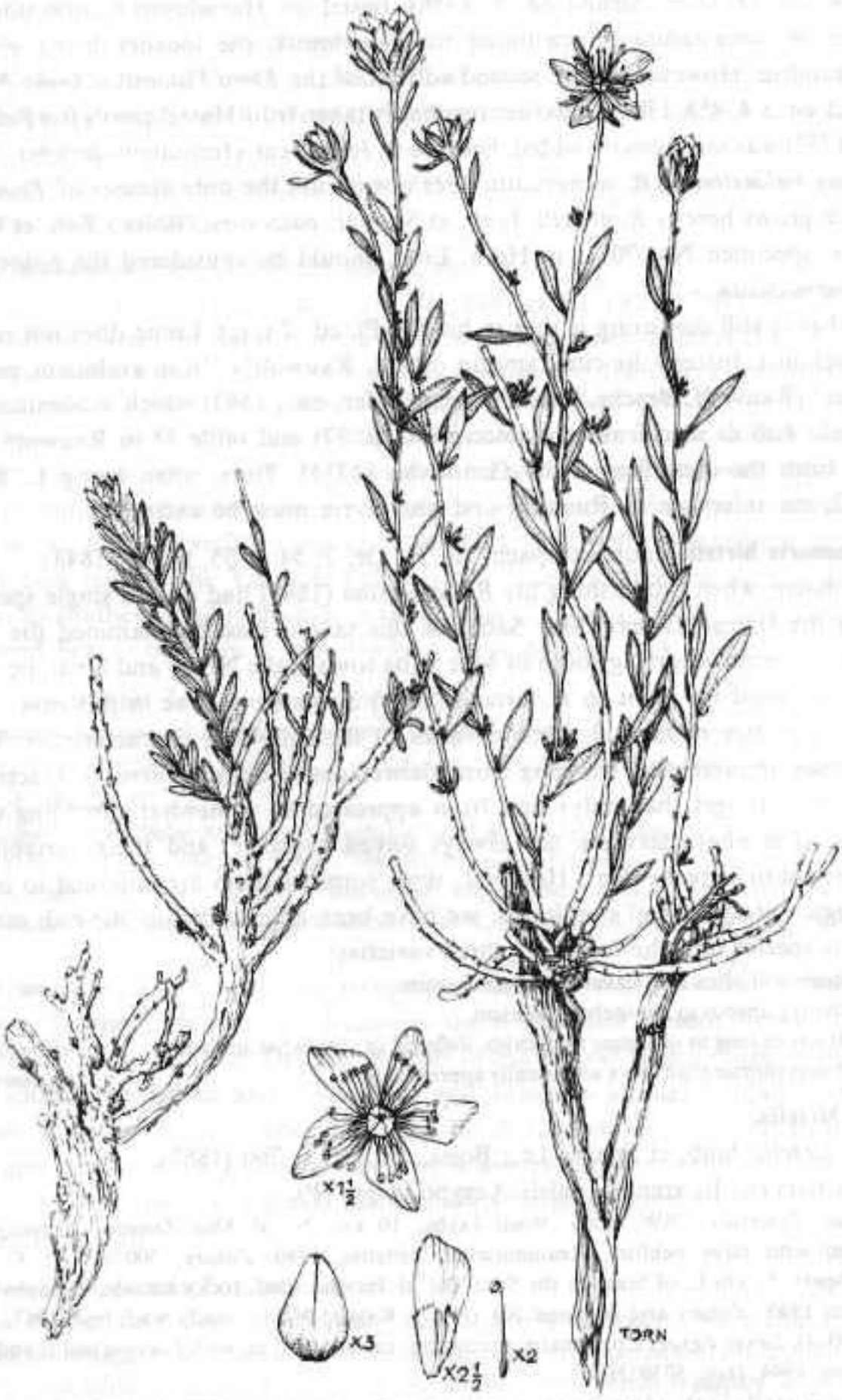

Fig. 1. *Reaumuria alternifolia* (Labill.) Britten. Winter habitat; flowering plant; corolla; sepal; petal; stamen.

Palaestina (Dissert. Strand ed. 1, 1756), based on Hasselquist's collections, the name *R. vermiculata* is attributed to Hasselquist, the locality being given as Alexandria. However, in the second edition of the *Flora Palaestina* (vide Amoen. Acad. ed. 3, 4: 458, 1788) Jerusalem (probably taken from Hasselquist's *Iter Palaestinum* 1757) was erroneously added, because in Jerusalem (Jerusalem–Jericho, p. 139 in *Iter Palaestinum*) *R. vermiculata* does not occur; the only species of *Reaumuria* which grows here is *R. hirtella* Jaub. et Sp. var. *palaestina* (Boiss.) Zoh. et Danin. Thus, specimen No. 701/1 in Herb. Linn. should be considered the holotype of *R. vermiculata*.

What is still confusing is that in his Sp. Pl. ed. 2 (l.c.), Linné does not refer to Hasselquist. Instead, he cites, among others, Rauwolf's "Kali arabicum, primum genus" (Rauwolf. Beschr. Raiss Morgenländer, etc., 1583) which is identical with *Salsola kali* as seen from the description (p. 37) and table 37 in Rauwolf (ibid.) and from the identification by Gronovius (1755). Thus, when citing L., Sp. Pl. ed. 2, the reference to Rauwolf and also Syria must be excluded.

Reaumuria hirtella Jaub. et Spach, Ill. Fl. Or. 3: 54 et 55, t. 244 (1848).

Boissier, when establishing his *R. palaestina* (1849) had only a single specimen from the Judean Desert (Mar Saba) of this taxon. Had he examined the whole array of forms occurring south of Mar Saba toward the Negev and Sinai, he would have assigned his plant to *R. hirtella* (1848) as we have done in this case.

As a matter of fact, *R. hirtella* varies in the following characteristics: length of leaves, indumentum (ranging from glabrescent to densely hirsute), bracts from shorter to longer than calyx and from appressed to somewhat spreading or deflexed. The characters are not always linked together, and their variability is consistent to a great extent. However, since some of them are confined to certain ecologico-geographical conditions, we have been able to divide our rich material of this species into the following three varieties:

1.	Stems and often also leaves and bracts hirsute	var. *hirtella*
—	Stems glabrous to minutely puberulent	2
2.	Bracts as long as or longer than calyx, deflexed or somewhat spreading	var. *palaestina*
—	Bracts shorter than calyx and usually appressed to it	var. *brachylepis*

Var. **hirtella**.

R. hirtella Jaub. et Spach, l.c.; Boiss., Fl. Or. 1: 760 (1867).

LECTOTYPE: In arenosis salsis Aegypti, *Lippi* (P).

Sinai Peninsula: SW. Sinai, Wadi Taybe, 10 km N. of Abu Zenima, gravelly wadi covered with large pebbles, Reaumurietum hirtellae, 1940, *Zohary*, 500 (HUJ); C. Sinai, Tih Desert, 33 km E. of Suez on the Suez–Bir el Hasana road, rocky hillside, Zygophylletum dumosi, 1940, *Zohary* and *Feinbrun* 501 (HUJ); Kala'at Nakhl, sandy wadi bed, 1967, *Danin* 918 (HUJ). *Lower Egypt*: Um Zenatir, precipitous ravine, 1097 m, with *Fagonia mollis* and *Gymnocarpos*, 1944, *Davis* 8030 (HUJ).

Var. *hirtella* is the dominant variety in central and southern Sinai (and probably also in Egypt). We have observed it in places ranging in altitude from sea level to

2,500 m, and in annual rainfall from 30 to 150 mm. Contrary to the following two varieties, it occurs on sandstones, magmatic rocks, limestone, clay and chalk. In the chalky slopes of Gebel el Igma (central Sinai), it dominates the larger wadis only when recently flooded but disappears after there have been two consecutive years of drought.

It is one of the most constant associates of the wadi vegetation in the chalky and limestone deserts.

Var. **palaestina** (Boiss.) Zoh. et Danin, stat. n.

R. palaestina Boiss., Diagn. ser. 1, 10: 10 (1849) et Fl. Or. 1: 760 (1867). Fig. 2.

HOLOTYPE: inter St. Saba et mare Mortuum (Palestine), *Boissier* (G.).

Palestine: Judean Desert, 22 km E. of Jerusalem, marly ground, 1927, *Eig, Zohary* et *Feinbrun* 101 (HUJ); northern Negev, env. of 'Arad, chalky ground 1966, *Danin* 96 (HUJ).

This variety dominates vast stretches of chalky rocks in the Judean Desert between sea level and 200 m. It very often represents the only dwarf shrub in a plant community consisting mainly of annual and perennial herbs. In such sites it enjoys an annual rainfall ranging from 150 to 200 mm. Its northern limit of distribution reaches the Yarmuk Valley where it is scattered on steep southern slopes; its southern limit is the hills in the vicinity of 'Arad (Negev). Approaching the Dead Sea, it becomes is and confined to wadis and rock fissures.

Var. **brachylepis** Zoh. et Danin var. n.

Bracteae adpressae, calyce multo breviores; caeterum ut in var. praecedente.

HOLOTYPE: *Palestine*, Negev, 2 km S. of 'Avdat, chalky slope, S. exposure, 1966, *A. Danin*, 505 (HUJ).

Palestine: Negev, Be'er Asluj to el Mushrife, 1952, *N. Feinbrun* 56466 (HUJ); 'Arava Valley, Wadi Aimr, sandy soil, 1942, *D. Zohary* 506 (HUJ). *Sinai Peninsula*: C. Sinai, Gebel Yiallaq, Ras Abu Qurun, in fissures of hard limestone, alt. 900 m, 1967, *A. Danin* 507 (HUJ); N. Sinai, Gebel Halal, Wadi Abu Seiyal, steep limestone cliff, N. exposure, alt. 500 m, 1968, *A. Danin* 508 (HUJ).

Var. *brachylepis* is much more xerophilous than the two previously mentioned varieties. Its main area of distribution is the central and eastern Negev as well as northern Sinai (Isthmus Desert). Its sites in the central Negev range in altitude from –300 m to 500 m above sea level and enjoy an annual rainfall of about 80 mm. It forms often unispecific dwarf shrub formations near Sde Boker on clays and marls. In the southern Negev it is one of the dominants of limestone and chalky mountains and gravel plains and its range includes areas with 30 mm of annual rainfall.

Reaumuria negevensis Zoh. et Danin, sp. n. Fig. 3.

(For diagnostic differences between this and related species see Table I).

Planta fruticosa, pumila, glabra, 15–30 cm. Caules numerosi, ascendentes, albicantes, inferne ramosi, sparse foliati, divaricati. Folia glabra, cylindrica, superne parum applanata, sessilia, subamplexicaulia; hyemalia 5–6 × 1 mm, aestivalia 2–3 × 1 mm. Flores 0.8–1 cm diametro, sessiles vel subsessiles, secundum caules primarios spicas interruptas formantes, sed ad ramos laterales

Fig. 2. *Reaumuria hirtella* Jaub. et Spach var. *palaestina* (Boiss.) Zoh. et Danin. Flowering plant; part of branch with a winter leaf and a brachyblast with summer leaves; flower; sepals; petal; stamens.

Fig. 3. *Reaumuria negevensis* Zoh. et Danin. Flowering branch; flower; sepals; petal; stamens; pistil; leaf cross section.

fere solitarii. Bracteae plures, foliaceae, cylindricae, glabrae, calyce multo breviores, erectae. Sepala ad medium connata; lobi ovati, non apiculati, marginiioneibus membranaceis integris. Corolla pallide rosea, calyce fere duplo longior; petala elliptica, unilateraliter erosula. Filamenta non (vel pauca tantum) basi dilatata haud dentata. Ovarium subconicum, 3 mm longum, stylo aequilongum. Fl. Maio–Junio.

HABITAT: Chalky ground in central Negev (and also in rock crevices of harder limestones further south).

Palestine: central Negev, environs of Mizpe Ramon, pebbly wadi bank, 700 m, 1963, *Danin* 12011 (Holotype, HUJ); 2 km S. of 'Avdat, chalky ground, E. exposure 650 m. 1966, *Danin* 190 (HUJ); northern Negev, env. of Be'er Sheva, grey steppe soil, ca. 400 m, 1967, *Danin*, 1400 (HUJ). *Sinai Peninsula*: Tih Desert, branch of Gebel Jiddi, 55 km E. of Suez, stony slope, Zygophylletum dumosi, 1940, *Zohary* and *Feinbrun* 509 (HUJ); Gebel Maghara, hard limestone, N. exposure, 1967, *A. Danin* 219 (HUJ).

TABLE I

MORPHOLOGICAL DIFFERENCES BETWEEN *R. negevensis* AND ITS TWO RELATED SPECIES

Characters	*R. negevensis*	*R. hirtella*	*R. vermiculata*
Angle between branches and stems	30^0—40^0	10^0—30^0	10^0—30^0
Cross section of branches	circular	circular	circular-angular
Leaf cover	sparse	fairly dense to dense	very dense
Indumentum of stems and leaves	glabrous	hirtellous to puberulent; winter leaves glabrous or hairy	glabrous
Leaf shape	fleshy, cylindrical, obtuse	fleshy, semicylindrical to flattish, obtuse	fleshy, linear, mucronate
Leaf sizes:			
summer leaves	2 × 1mm	2–4 × 1 mm	2 × 1 mm
winter leaves	5–6 × 1 mm	6–12 × 1–2 mm	10 × 5 mm
Petals	8 × 3 mm	8–13 × 5 mm	
Calyx	glabrous; lobes ovate, apiculate, with entire margin	hirtellous to puberulent or glabrous; lobes oblong or triangular, with triangular or lanceolate to acuminate tip and dentate margin	glabrous; lobes ovate or elliptical, long-mucronate, with entire margin
Bracts	obtuse, dense, appressed, shorter than calyx	obtuse, loose or dense, appressed to spreading, shorter to longer than calyx	mucronate, dense, appressed, shorter than calyx
Filaments	partly dilated but not dentate	mostly dilated, dentate	not dilated, not dentate

This species is rather common in the central Negev and in northern Sinai. In the former is grows on grey chalky ground and is a dominant of a dwarf-shrub community, where it is sometimes associated with *Artemisia herba-alba* and *Chenolea arabica*. In the borders of its area it occurs as an associate of the ARTEMISIETUM HERBAE-ALBAE and the ZYGOPHYLLETUM DUMOSI.

R. negevensis occurs mainly on the mountains and plateaux enjoying 70–150 mm of rain; its altitude ranges from 200 to 1,500 m. It dominates Eocene chalks in the foothills of the northern and central Negev and in the northern Sinai anticlines. Its western border is the Sahaba-Budia chain of hills at and near the eastern borders of the Suez Gulf.

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