1949. Studies in western violets—IV. Leafl. West. Bot. 5:141–147.
——. Studies in western violets—V. Leafl. West. Bot. 5:173–177.
——. Studies in western violets—VI. Madroño 10:110–128.
1951. A partial list of seed plants of the North Coast counties of California arranged alphabetically under their families. Santa Rosa Jun. Coll., June, 1951 [mimeographed].
1953. Studies in western violets—VII. Madroño 12:8–18.
——. A correction in the status of Viola macloskeyi. Madroño 12:60.
1954. A partial list of seed plants of the North Coast Ranges by the North Coast Herbarium. Santa Rosa Jun. Coll., June, 1954 [mimeographed; arranged alphabetically by families].
1957. Studies in western violets—VIII. The Nuttal[l]ianae continued. Brittonia 9:217–230.
1958. Supplement to 1954 partial list of seed plants of North Coast Ranges of California by the North Coast Herbarium. Santa Rosa Jun. Coll., 1958 [mimeographed].
1960. Studies in western violets—IX. Miscellaneous species in the sections Nomimium and Chamaemelanium. Madroño 15:199–204.

CYTOLOGICAL OBSERVATIONS ON ADIANTUM × TRACYI C. C. HALL[1]

WARREN H. WAGNER, JR.

The California maidenhair fern, *Adiantum jordanii* C. Muell. (syn. *A. emarginatum* D. C. Eaton) is one of the endemic pteridophytes of the California Floral Province (Howell 1960). In the North Coast Ranges where it comes into association with the wide-ranging *A. pedatum* L., there has occasionally been found an intermediate plant, *A.* × *tracyi* C. C. Hall, which combines the characteristics of these sharply different species (Wagner 1956). A single plant of the intermediate fern was discovered as early as 1895 along the Eel River near Pepperwood, Humboldt County, by Mr. J. P. Tracy, and the observations to be recorded here are based on a propagated descendant of that plant. Other naturally occurring specimens of *A.* × *tracyi* have been found in Sonoma and Marin counties. Easily propagated from rhizomes, this fern has proved a decorative and hardy garden plant.

Adiantum × *tracyi* has been interpreted as an interspecific hybrid because of its morphological intermediacy in a number of obvious features; its sporadic distribution, and occurrence where the putative parents grow nearby; and the irregularity of its spores (Wagner, *ibid.*). The facts to be reported below tend to supply additional evidence for considering that this fern is a natural hybrid. To obtain cytological observations, the immature sori of *Adiantum* × *tracyi* were fixed in Newcomer's Fixing Fluid (Newcomer, 1953). Collections were made in May, June, and July 1960 from plants growing at the University of Michigan Botanical Gardens.

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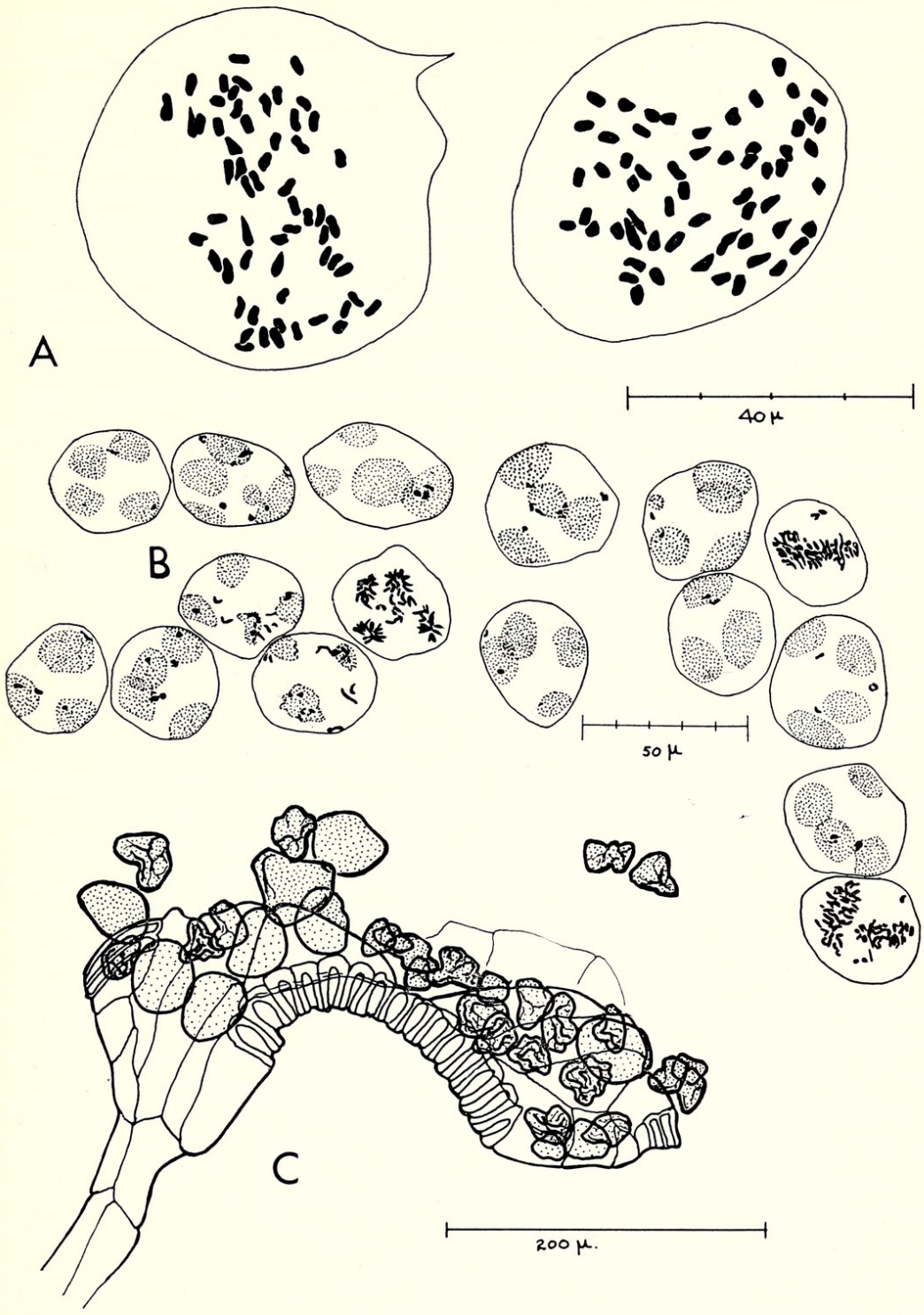

FIG. 1. *Adiantum* × *tracyi*: A, meiotic metaphase showing 59 univalents; B, sporocytes extruded from a single sporangium and squashed, showing different stages and unassimilated chromosomes; and C, sporangium forced open with alcohol and diaphane, showing part of spore complement; note small wrinkled spores and large smooth spores. (Camera lucida drawings, based on material obtained from descendant of the original plant.)

The proper stages of meiotic division were found by selecting pinnules which had reached full size and upon which the sori were of approximately mature dimensions but pale greenish-white in color. Because of the leathery false indusium it was difficult to scrape out the young sporangia. The entire indusium was removed, therefore, placed on a microscope slide in acetocarmine stain, and broken apart, after heating, by tapping briskly with the point of a dissecting needle on the cover-slip. This broke apart the false indusium and the sporangia (and sometimes, unfortunately, the cover-slip), but the spore mother cells became sufficiently separated so that they could be properly squashed and studied under the microscope. Camera lucida drawings were made of good preparations, and the slides were made permanent.

The observations of meiosis were interesting for two reasons. First, there was no pairing at all between the chromosomes. At metaphase, the chromosomes become very short and oblong in outline, and in not one of the numerous figures observed were there any indications of pairing. This fact suggests that there is a lack of homology between the two genomes that make up the chromosome complement, and that they very likely came from different species.

The second interesting observation was that the number of chromosomes is 59. Such a number seems at first unusual for a presumably diploid plant, and it suggests at least two explanations: either the plant is one in which there has been the loss or addition of a chromosome, or it is a hybrid between parents with different chromosome numbers, one of them with an odd number and the other with an even number.

The distribution of chromosomes at metaphase is irregular, and tetrad formation is characterized by three to five daughter nuclei plus a varying number of excluded chromosomes, as shown in figure 1, B. There is some lack of synchrony in the meiotic divisions of the sixteen spore mother cells, so that at one time it is possible to find several different stages in tetrad formation in the same sporangium. This is unlike the situation ordinarily observed in normal leptosporangiate fern species, where sporogenesis proceeds approximately simultaneously in all sixteen spore mother cells of a sporangium. As would be expected and as was reported earlier (Wagner, 1956), the spores are abortive and irregular. Even at an early stage in the spore maturation their irregularity is evident. Many of them are small and become corrugated or folded, and in the same sporangia others are very large and smooth. Figure 1, C, shows a mature sporangium forced open by alcohol and diaphane and with part of the variable spore complement present.

That *Adiantum* × *tracyi* may actually have arisen from parents with different chromosome numbers is suggested by the fact that in four genera of Adiantaceae (*Adiantum, Cheilanthes, Aleuritopteris,* and *Saffordia*) two numbers are known, viz. n = 29 and n = 30, among the species of each. The other adiantaceous genera, so far as is known at

present, have only single numbers among their species, the number of each genus being either n = 29 or n = 30 (Manton 1959). *Adiantum pedatum,* which is one of the presumed parents of *A.* × *tracyi,* has been observed in material from two regions (Vancouver: Manton 1959; and Ontario: Britton 1953) to have n = 29. If it can be assumed that this number is characteristic of *A. pedatum* everywhere, then we may suggest that the other presumed parent, the endemic Californian *A. jordanii,* which has not yet been examined cytologically, will probably prove to have n = 30 chromosomes.

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Literature Cited

Britton, D. M. 1953. Chromosome studies on ferns. Am. Jour. Bot. 40:575–583.

Howell, John Thomas. 1960. The endemic pteridophytes of the California Floral Province. Am. Fern Jour. 50 (no. 1):15–25.

Manton, I. 1959. Chromosomes and fern phylogeny with special reference to "Pteridaceae." Jour. Linn. Soc. Bot. 56:73–91.

Newcomer, E. H. 1953. A new cytological and histological fixing fluid. Science 118:166.

Wagner, Warren H., Jr. 1956. A natural hybrid, × Adiantum tracyi C. C. Hall. Madroño 13:195–205.

TAXONOMIC AND NOMENCLATURAL NOTES ON PLATYDESMA (HAWAII) AND A NEW NAME FOR A MELICOPE (SOLOMON ISLANDS)[1]

Benjamin C. Stone [2]

The genus *Platydesma* was proposed by Horace Mann, Jr. (1866) to include one species, *P. campanulatum* (–*a*), which had been collected by Mann and W. T. Brigham "on the mountains behind Honolulu." A slightly expanded description is found in Mann (1869). Two species were added to the genus by Hillebrand (1888) in his "Flora of the Hawaiian Islands": *P. cornutum* (–*a*), from the island of Oahu, and *P. rostratum* (–*a*), from the island of Kauai. Hillebrand (*op. cit.*) also transferred to *Platydesma* a species described by Asa Gray as *Pelea auriculaefolia* (1854, p. 343; 1857, pl. 36), but this was an error, as Rock (1913, 1918) has shown, for Gray's original placement is correct. Although Hillebrand

[1] Studies in the Hawaiian Rutaceae, I. This paper is the first in a series of studies concerned primarily with the Hawaiian Rutaceae, of which the second and third papers are now in press.

[2] This work was carried out while the writer was Research Assistant, Botany Department, University of Hawaii, Honolulu. It is an outgrowth of studies for a monograph of the genus *Platydesma,* now in press.