

# Eighteen Chromosome Pairs in an American Bamboo, *Chusquea subtessellata* Hitchc.

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## INTRODUCTION

*Chusquea subtessellata* Hitchc. is a small bamboo endemic in Costa Rica, where it grows at elevations of 3,000 m., and above. It forms perhaps the most notable feature of the vegetation of the Costa Rican "paramos". Despite the hardness of the leaves, it is palatable for cattle and has some local importance as a pasture plant (6).<sup>2</sup>

## MATERIALS

In February 1961 some flowering specimens of this species were encountered on the summit of the Cerro de las Vueltas (3,156 m. above sea level), in the Talamancan massive. Flowers were fixed at noontime in acetic alcohol (1 part of glacial acetic acid to 3 parts of 95-percent ethyl alcohol), wherein they remained until preparation could continue 2 months later. Acetic orceine squash preparations were made of the anthers. The stainability of the chromosomes was not good, and phase-contrast optics was used for observations and for photographs.

## OBSERVATIONS

Meiotic stages of pollen mother cells were sufficiently encountered to get an idea of the chromosome relations. Leptotene, pachytene, diakinesis, and both divisions were present. Some observations concerning the early prophase are worth mentioning. The most notable part of the nucleus before diakinesis is the nucleolus. In these early stages a very strong synizesis occurs. The chromosomes form a compact but slightly colored mass at the side of the nucleolus. No nuclear membrane is visible, but there is a vacuole around the chromosome-nucleolus body. If the said body is squeezed out of the cell, it maintains its shape unaltered (fig. 1,A).

Because of lack of diplotene the chiasma frequency and location remain unknown. The chromosomes are so small that one chiasma per bivalent seems most probable. In diakinesis the number of bivalents looks variable at first, but this is caused by differential condensation of chromosome parts, or even by some degree of "distance pairing". When the bivalents are compact enough their number appears to be 18. One of them is associated with the nucleolus (figs. 1,B and 2,A).

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<sup>2</sup> Italic numbers in parentheses refer to Literature Cited. p. 101.

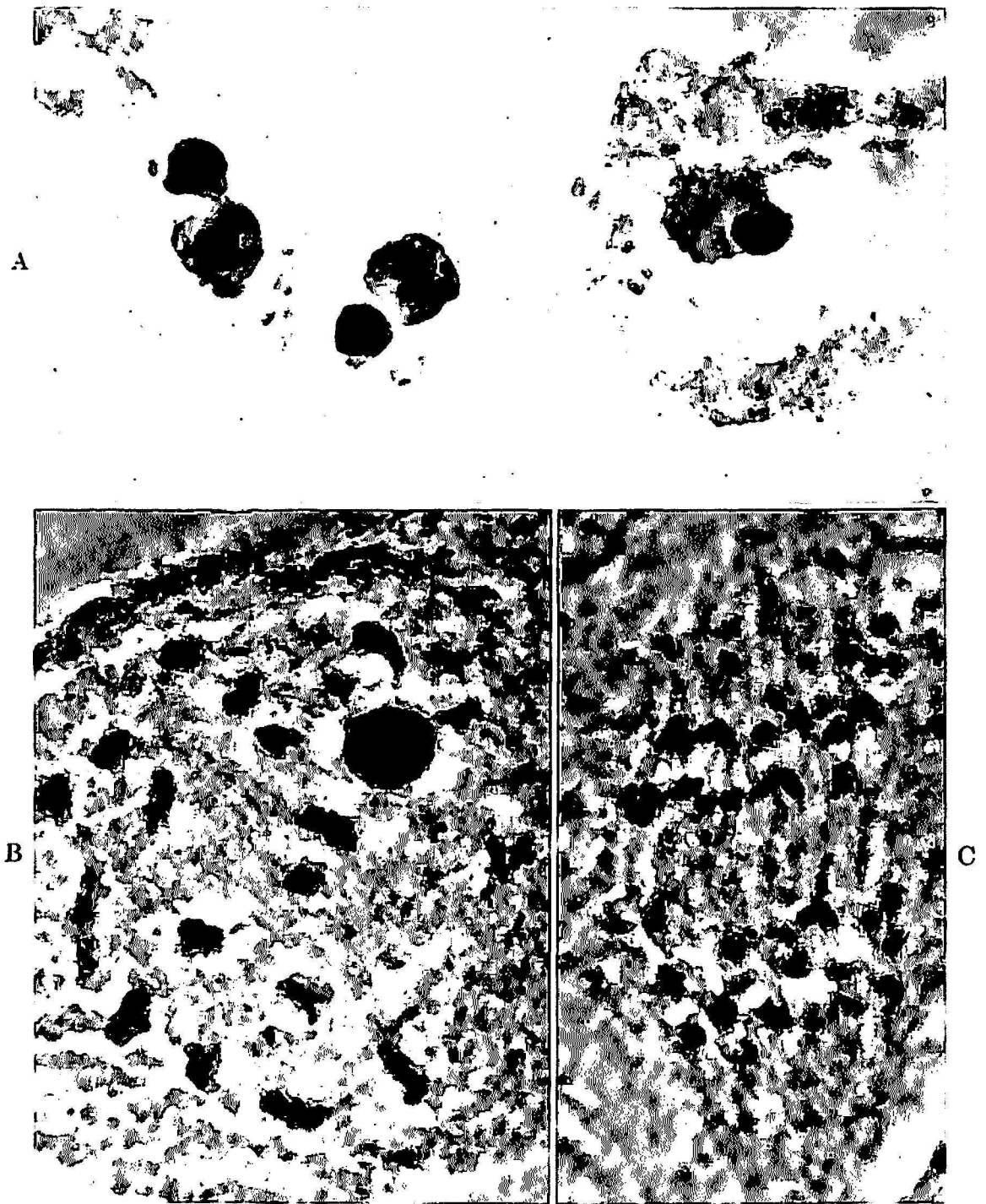


FIG. 1.—A, Compact bodies formed by synizesic chromatin and nucleolus. The 2 bodies at left are completely squeezed out of the cells by the squashing pressure; at right is shown a cell wherein the cytoplasm is partly ruptured. B, Diakinesis, 18 bivalents. From the nucleolus, 3 ends of the nucleolus-associated bivalent extend. C, Anaphase of the first meiotic division. Magnification  $1250\times$  in all photographs. Kodak Ortho Contrast Process film with phase contrast.

First meiotic metaphase and anaphase confirm the number seen in diakinesis. Anaphase is even more suitable for that purpose than the metaphase, where the bivalents tend to group together. The 18 chromosomes are small and perhaps all metacentric (fig. 1,C, and fig. 2,B). No anomalous behavior of the chromosomes was seen in the meiotic divisions. The meiosis in PMC is apparently regular and results in well-functioning pollen.

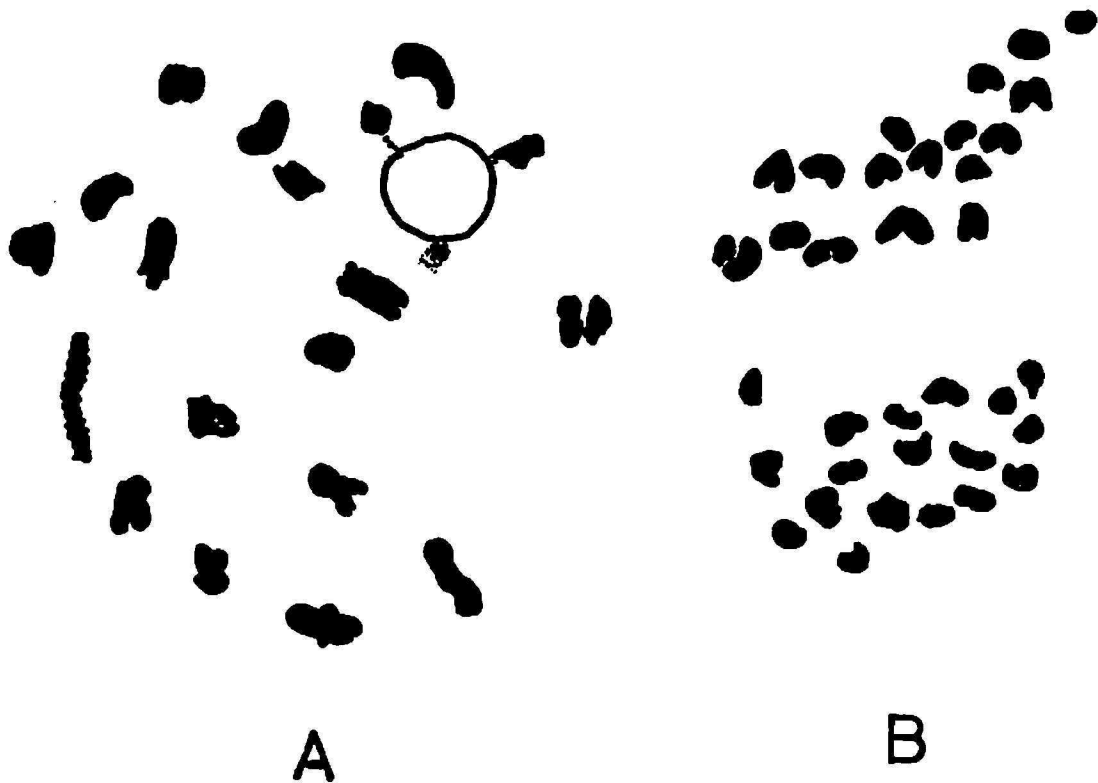


FIG. 2.—A and B, Simplified drawings for interpretation of fig. 1,B,C, respectively.

#### REMARKS

Except for the two unidentified *Sasa* species, which have the same number as *Chusquea subtessellata* (4, 5), all cytologically studied bamboos have higher numbers. Hunter (2) counted  $2n = 54$  in two species, *Phyllostachys flexuosa* A. & C. Riv. and *Arundinaria (Pleioblastus) pygmaea* Kurz, and Parthasarathy (3)  $2n = 70$  in the common bamboo *Bambusa bambos* Backer & Heyne, and *Dendrocalamus strictus* Nees. For the two last-mentioned species, earlier reports give  $2n = 72$ . In *Dendrocalamus brandisii* Kurz, Janaki-Ammal (unpubl., according to 1) found  $72 + 2B$  (two supernumerary or B chromosomes). All other determinations, about 40 cases, revealed multiples of 12, the highest diploid number being 72 (1). Consequently, 12 seems quite acceptable as the basic number for the tribe Bambusae.

*Chusquea subtessellata* is the first bamboo of American origin as

yet checked cytologically. As the sample studied belongs to a small population of an endemic species confined to rather exceptional conditions, its chromosome relations hardly represent any common pattern for Neotropical bamboos. Anyway, it is interesting to know that the smallest chromosome number of Bambusae occurs in a wild American bamboo species.

#### SUMMARY

Eighteen pairs, the lowest chromosome number known in the Bambusae, was encountered in *Chusquea subtessellata* Hitchc., an endemic bamboo from the Costa Rican "paramos".

#### RESUMEN

El más bajo número de cromosomas—18 pares—de la tribu Bambusae, se encontró en *Chusquea subtessellata* Hitchc., un bambú endémico de los páramos de Costa Rica.

#### LITERATURE CITED

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