RNA synthesis in the ebony mutant prothoracic gland (Fig. 1-C) is somewhat lower than wild type during puparium formation and drops to a lower level during pupation. Synthesis increases more sharply than wild type during eye pigmentation, remains high at bristle pigmentation, then, unlike the wild type, reaches a peak in the ready-to-emerge imago. In the corpus allatum (Fig. 1-D) RNA synthesis is higher at puparium formation, decreases to about the same level as the wild type at pupation and does not show the same increase of uptake at eye pigmentation. This low activity persists through the stage of bristle pigmentation, but uptake increases to a high peak at the period of pre-emergence.

A comparison of the activity of the ring gland during pupal development in the monogenic ebony mutant and in the wild type shows a dissimilarity in the patterns of synthesis. The wild type gene and its allele "ebony" are not equally susceptible to regulator influences. If RNA synthesis in the nucleus can be interpreted to reflect a derepression of the repressor locus of the chromosome, then the response of the mutant gene is quantitatively different from the wild type.

References:

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Heed, W. B., J. S. Russell, and B. L. Ward.
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Host specificity of cactiphilic Drosophila
in the Sonoran Desert.

Arborescent cereus cacti of the Sonoran Desert provide specific habitats for different species of Drosophila. From samples of rotting limbs collected in the field from 1962 to 1967, we have reared the following species in the laboratory (see localities on map): Lophocereus schottii (senita) 19 localities in Jan. Feb. May June Nov. Dec. reared 2,380 D. pachea; Carnegiea gigantea (saguaro) 4 localities in Jan. Feb. Aug. Oct. Dec. reared 12,172 D. nigrospiracula; Pachycereus pringlei (cardon) 3 localities in Feb. May Dec. reared 353 D. nigrospiracula; Machaerocereus gummosis (agria) 6 localities in Feb. Mar. May Nov. reared 1,048 D. mojavensis; Lamaireocereus thurberi (organpipe) 5 localities in Jan. Nov. Dec. reared 113 D. mojavensis, 3 D. arizonensis, 1 D. longicornis; Rathbunia alamosensis (cina) 4 localities in Jan. Feb. Nov. Dec. reared 790 D arizonensis, 20 D. mojavensis, 13 D. pseudoobscura, 1 D. hamatofila.

Of the four most abundant species, D. pachea is the only one truly monophagous. D. nigrospiracula has been bred also from Ferocactus. It is therefore classified as an oligophagous species. D. arizonensis is polyphagous having been bred also from Ferocactus, Opuntia, squash and citrus fruits. D. mojavensis has been bred also from Opuntia. It becomes more difficult to classify these species within the large genus, Drosophila, as each one becomes more monophagous. For instance, D. pachea (monophagous) belongs to a very small species group having only a few morphologically distant relatives. D. nigrospiracula (oligophagous) is a member of the large repleta species group but does not clearly fit any known subgroup. D. mojavensis and D. arizonensis (polyphagous) are closely related sibling species and have 10 other closely related members collectively known as the mulleri subgroup of the repleta group. The different degrees of host plant specificity may represent different levels of time with D. pachea being the oldest. We thank Dr. L. E. Mettler for checking D. arizonensis and D. mojavensis cytologically.

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Inability of D. pachea to breed in
cereus cacti other than Senita.

From our records D. pachea breeds only in the rot pockets of the arms of the cereus cactus, Lophocereus schottii (called senita) where it obtains the sterol, schottenol, necessary for its growth and reproduction. The question arises whether or not pachea can utilize other cereus cacti in the laboratory which grow sympatric with senita in the Sonoran Desert.

| Cactus cube + banana medium | Progeny A | B | Total | Female Progeny Fertile | Sex Ratio F | M | Av. no. filamented eggs/F | Range/F | No. females dissected |
|---|---|---|---|---|---|---|---|---|---|
| Lophocereus schottii (senita) | 198 | 163 | 361 | yes | 55 | 47 | 21 | (7-40) | 10 |
| Lemaireocereus thurberi (organpipe) | 60 | 41 | 101 | no | 14 | 36 | 5 | (0-16) | 14 |
| Rathbunia alamosensis (cina) | 16 | 30 | 46 | no | 11 | 20 | 3 | (0-9) | 4 |
| Machaerocereus gummosis (agria) | 24 | 7 | 31 | no | 4 | 17 | 1 | (0-4) | 4 |
| Pachycereus pecten-aboriginum (hecho) | 10 | 11 | 21 | no | 2 | 10 | 0 | | 2 |
| Pachycereus pringlei (cardon) | 6 | 3 | 9 | no | 1 | 5 | 0 | | 1 |
| Carnegiea gigantea (saguaro) | 1 | 0 | 1 | no | 0 | 1 | 0 | | 0 |
| No cactus | 39 | 64 | 103 | no | 19 | 49 | 5 | (0-23) | 10 |
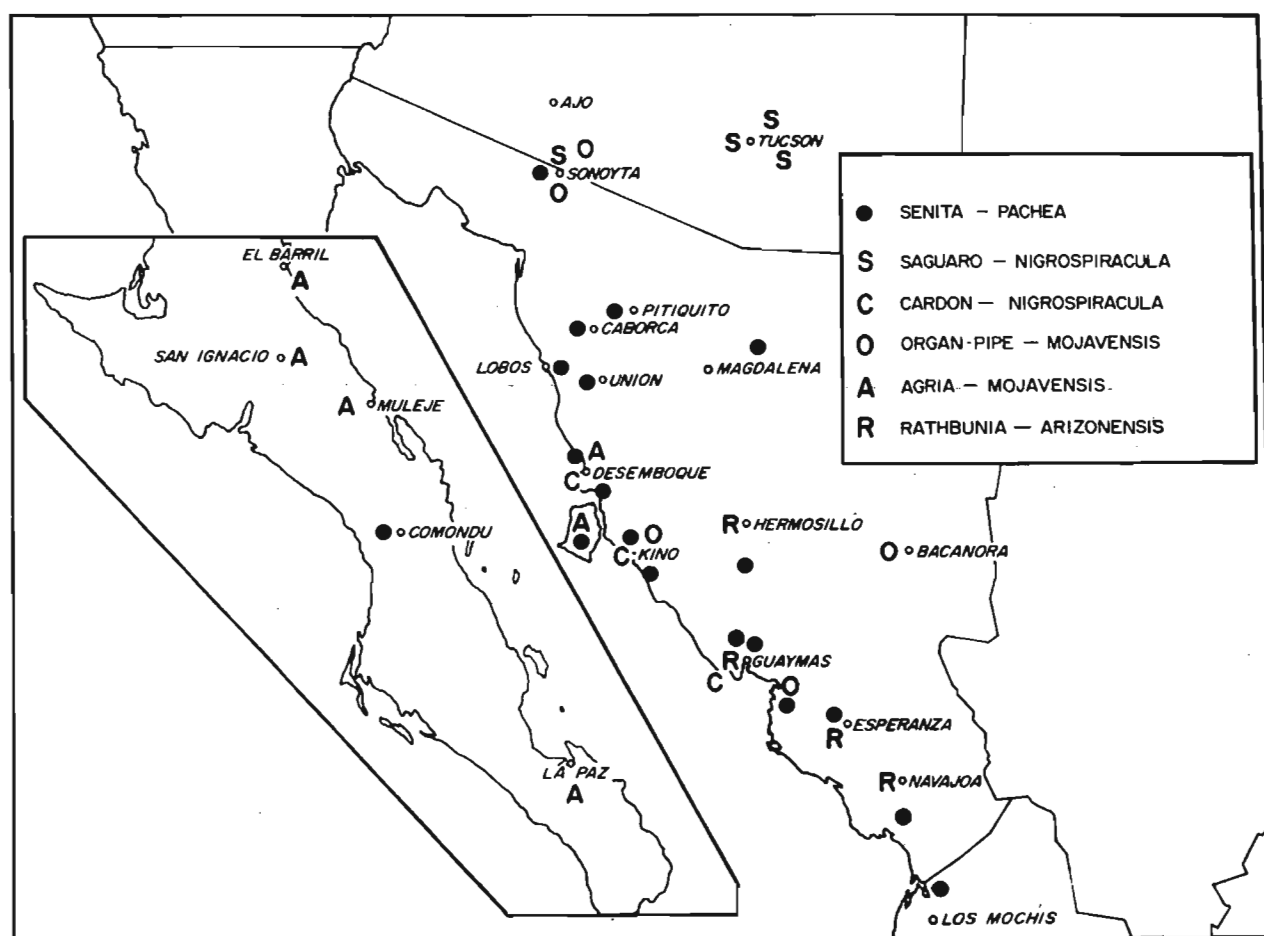
The tests confirm our field observations that pachea is monophagous. The table summarizes the data from 14 test vials run concurrently with 7 kinds of cereus cacti and two control vials (no autoclaved cube of cactus added to banana media). Each vial was charged with 15 egg-laying females and 15 fertile males randomized from 5 cultures of different geographic origin. The parents, which were as yet alive, were discarded 22 days later to prevent overlap with the progeny, which began emerging 3 days after discard. Many eggs were deposited by the parents on senita, organpipe, and agria cactus cubes. Only a few eggs were deposited in the vials with saguaro. All progeny were placed on fresh banana media having the same kind of cactus cube as their parents. Twenty-one days after the first emergence, the senita progeny had deposited many eggs, which later hatched, while all other cacti and the control progeny had deposited none. Male progeny from all vials were fertile. There were 2.7 times more male than female non-senita progeny among the flies selected for dissection. Even though eggs with filaments were found in some of the ovaries of non-egg laying progeny, the filaments were not as distinct as the senita progeny indicating that development in this case was arrested in a late stage. Several of the cacti, other than not containing the correct sterol, also appear to inhibit D. pachea in parental egg laying and larval development. Separate tests were run with Peniocereus greggii (night-blooming cereus). Both the tuberous roots and the thin stems were negative for supporting pachea. These 8 species of cacti represent the common cereus cacti of the subtribe Cereanae (arborescent cacti) in the Sonoran Desert. The genera Bergerocactus, Cephalocereus, Myrtillocactus and Wilcoxia have more local distributions in this desert and have not been tested.

Mather, Wharton B. University of Queensland, Australia. Chromosomal polymorphism in two marginal populations of D. rubida.

When D. rubida was discovered at Cairns, Queensland, Australia in 1958 it appeared to be monomorphic for chromosomal inversions (Mather, 1961) which fitted well with the hypothesis of da Cunha and Dobzhansky (1954) that inversion heterozygosity falls off towards the periphery of the range of a species. Cairns is certainly near the southern limit of the range of the species. Since 1958 it has been shown that D. rubida is highly polymorphic for inversions throughout Papua and New Guinea.

Two stations in the Cairns area were sampled with banana bait in June 1966 with the results shown in the table. Crystal Cascades is 7 miles S.W. of Cairns and Lake Barrine 21 miles S.S.W. of Cairns. Both habitats consist of tropical rain forest and were collected from within a few days of each other but whereas Crystal Cascades is at sea level Lake Barrine is on the Atherton Tableland at 2400 feet.

From the table it will be noted that both stations are polymorphic for inversions. However this polymorphism is not nearly so marked as at stations nearer to the centre of the range of the species in Papua and New Guinea.

Acknowledgements are due to Sheridan Butler and V. Baimai for technical assistance.

| Chromosome | Crystal Cascades % | | Lake Barrine % | |
|---|---|---|---|---|
| | ♂ | ♀ | ♂ | ♀ |
| II + | 93.4 | 94.2 | 96.9 | 92.9 |
| RC | 6.6 | 5.8 | 3.1 | 7.1 |
| III + | 72.1 | 73.1 | 68.8 | 75.7 |
| A | 1.8 | 1.9 | - | - |
| B | 2.2 | 1.9 | - | - |
| D | 26.6 | 25.0 | 31.3 | 24.3 |
| Flies scored | 113 | 26 | 16 | 35 |

References:
da Cunha, A. G. and Th. Dobzhansky, 1954. A further study of chromosomal polymorphism in Drosophila willistoni in relation to the environment. Evolution, 8:119-134.
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