lation was produced by a Beltone audiometer, which delivered a sound to one ear at 500 cy/sec and approximately 40 db above the level of audibility. The brain waves were recorded with a Grass model 3 electroencephalograph, frontal, central, and occipital or frontal, temporal, and occipital electrode placements being used. All subjects showed an alpha rhythm present at rest for at least 50 percent of the test period.

The subject was first presented with the light stimulus of 3-sec duration several times to ascertain that light provoked the usual suppression of alpha activity over the occipital regions. This was followed after a brief interval by a sound stimulus of 4-sec duration, repeatedly presented until at least five successive tone presentations failed to suppress alpha activity. The subject was then exposed to paired sound and light stimuli 50 times at irregular intervals, the sound appearing 0.8 to 1.0 sec before the light, with both continuing simultaneously for 3 sec. The interval between the sound and light was automatically timed and remained constant in each individual.

The resting electroencephalogram was evaluated, and the number of conditioned cerebral responses appearing in 50 presentations was ascertained by one of us (C. E. W.) without knowledge of whether the record was obtained from a control subject or from a patient. A conditioned cerebral response was considered to have occurred when the alpha rhythm was obliterated or strikingly depressed following the presentation of the tone and before the appearance of the light.

The resting electroencephalograms of the two groups were indistinguishable. In 23 control subjects the number of conditioned cerebral responses appearing in 50 paired sound-light stimulations ranged from 5 to 16, with a mean of 10.9, a median of 11, and a standard deviation of ± 3.25. In the 15 patients the number of conditioned cerebral responses ranged from 2 to 14, with a mean of 4.8, a median of 4, and a standard deviation of ± 3.28. The difference between these two means is statistically significant, the likelihood of their occurring by chance being less than 1 percent.

These observations demonstrate that the ability to develop conditioned cerebral responses is significantly impaired in a group of patients showing prolonged difficulties in adaptation and severe anxiety when compared with the ability to develop such responses in a group of subjects without obvious impairment of nervous system function. These data are of interest from several standpoints. First, they demonstrate, in subjects suffering from a so-called "functional" nervous system disease without evidence of gross structural abnormalities, failure of the brain, as indicated by its electrical activity, to respond in a normal fashion to external stimuli.

Second, such observations may perhaps help to explain why electroencephalographic studies have been largely disappointing in showing impairment of the highest integrative functions of man. Numerous investigations have revealed only minor differences between the electroencephalograms of normally functioning subjects and those of patients with severe neuroses and psychoses. Perhaps more sensitive methods of measuring responsiveness in the electroencephalogram may demonstrate other evidences of impairment in the "functional" disorders of the brain.

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Chromosome Number of the Chimpanzee, Pan troglodytes

Abstract. The chromosome numbers of nine chimpanzees (*Pan troglodytes*) have been determined by the bone marrow technique. The diploid number in this species is 48, with a probable XX-XY sex chromosome constitution.

In 1940, Yeager, Painter, and Yerkes (*1*), from an examination of spermatogonial diakineses, reported the diploid chromosome number of a chimpanzee to be 48. No further reports of chromosome numbers in the anthropoid apes have been presented, nor has there been confirmation of the original report since the development of improved cytogenetic techniques. The latter point is of particular interest because of the recent revision of the human chromosome number from $2n = 48$ to $2n = 46$ (*2*).

We have been able to ascertain the chromosome numbers of nine individuals of *Pan troglodytes* (seven males and two females), which were sacrificed because of infection with tuberculosis (*3*). Anesthesia was induced with ether and maintained for 3 to 5 hours with Nembutal. This period afforded sufficient time for the action of the mitotic poisons used: either colchicine, 0.25 mg/kg injected intraperitoneally, or Colcemid (*4*), 6 mg per animal injected intravenously.

Bone marrow was obtained from the proximal third of the humerus (in one case from the radius); it was suspended in 1.12 percent sodium citrate at 37°C for 20 to 30 minutes, centrifuged, and either fixed in cold alcohol–acetic acid and prepared by the Feulgen squash method (*5*) or fixed in 50 percent acetic acid and stained with lactic-acetic orcein and then squashed (*6*). Counts of suitable metaphase plates were made directly from the preparations.

Table 1. Distribution of chromosome numbers.

Specimen		Number of cells scored for various chromosome numbers				
		45	46	47	48	48+
P53	♀	1	1	3	10	1
P60	♀	1	1	4	18	0
P66	♂	1	2	3	8	0
P74	♂	0	0	1	8	1
P79	♂	0	1	4	10	0
P102	♂	0	0	0	5	1
P108	♂	0	0	1	7	1
P118	♂	0	0	1	4	0
N613	♂	0	5	11	58	4
Total		3	10	28	128	8

Table 1 presents the distribution of chromosome numbers obtained in the nine individuals and confirms the observation of Yeager, Painter, and Yerkes (*1*) that the diploid chromosome number in this anthropoid ape is 48.

Figure 1 is a metaphase plate from a female individual (P53) prepared by the Feulgen method.

Comparison of the chromosomes of the sexes suggests an XX-XY sex chromosome constitution, the X being a moderately large metacentric and the Y probably a very small metacentric chromosome. No evolutionary significance can as yet be attributed merely to the difference in chromosome number between man ($2n = 46$) and the

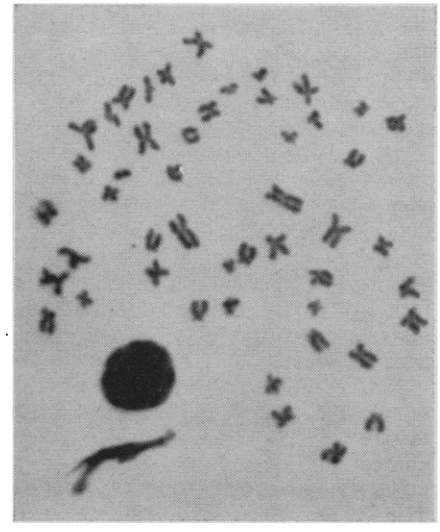

Fig. 1. Metaphase plate from a *Pan troglodytes* female, prepared by the Feulgen method: $2n = 48$.

chimpanzee ($2n = 48$). Knowledge of the significance of the chromosome number of the chimpanzee in terms of primate evolution is dependent, among other things, on a detailed analysis of the karyotype as well as upon the chromosome numbers and karyotype analysis of the other anthropoid apes.

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Induction of Staminate Flowers on Gynoecious Cucumbers with Gibberellin A_3

Abstract. Staminate flowers induced on gynoecious plants permitted the establishment and increase of inbred lines bearing only pistillate flowers. This method of altering sex expression has practical applications in developing F_1 hybrids, and is useful in studying the physiology and genetics of sex expression.

Completely female (gynoecious) and predominantly female types of sex expression found in certain Japanese and Korean varieties of cucumbers have been recognized as sources of genes that might be utilized to develop female inbred lines for hybrid seed production (*1–3*). Environment and growth regulators alter sex expression in monoecious varieties (*4–6*), and there is wide genetic variability in sex expression (*1–3*, *7*). Stimulation of pistillate flower production with l-naphthalene acetic acid (*4*), and inhibition of pistillate flowers with gibberellin (*6*, *8*), are of special interest in our efforts to utilize genetic variability in sex expression for hybrid seed production.

Beginning in 1954 with a gynoecious segregate found in the Korean variety Shogoin (PI 220860), we developed a number of inbred lines segregating up to 80 percent of gynoecious plants. These inbred lines were used as parents in hybrid seed production by rogueing monoecious segregates from the female parent rows grown in an isolated seed plot provided with a monoecious pollen parent (*3*). This method of seed production is practical and has produced hybrids with a high degree of heterosis. In the U.S.S.R., Mescerov (*2*) independently proposed an almost identical technique for production of F_1 hybrid seed, and likewise observed a striking heterotic effect in his hybrids.

In most of our segregating lines, some predominantly female plants (50 percent or more of the nodes bearing pistillate flowers) were difficult to distinguish from gynoecious plants at the ten-node stage, when seed plots were rogued. The most troublesome were those that developed only one or two staminate clusters after rogueing. This type of predominantly female plant was infrequent, but still a source of some contamination in seed plots. In an effort to eliminate staminate flowers on predominantly female segregates, several chemical growth substances, including gibberellin A_3 (*9*), were applied in 1958 to the foliage of field-grown cucumber plants.

The late developing staminate flowers on predominantly female plants were not completely eliminated. However, gibberellin treatment induced staminate flowers on some plants that would have remained gynoecious. In one line, 17 out of 83 nontreated plants bore staminate flowers compared with 25 out of 33 following foliar applications of 250 parts per million gibberellin. There were 12.4 staminate flowers per 100 nodes on gibberellin-treated plants and 1.3 on the controls.

One completely gynoecious hybrid arising from a cross of gynoecious × predominantly female provided uniform gynoecious plants for further tests in the greenhouse in the fall of 1958. No staminate flowers were produced on control plants, while increasing staminate flower production was observed as the concentration of gibberellin was increased from 250 to 1500 parts per million, and as the number of applications was increased from one to four. Plants receiving four weekly applications of 1500 parts per million produced an average of seven nodes bearing staminate flowers. The induced flowers were normal and produced abundant pollen. Many successful pollinations were accomplished. Homozygous gynoecious inbred lines have been developed through five generations of self-pollination with pollen from staminate flowers induced on gynoecious plants.

Field experiments in 1959 demonstrated a wide range of effective induction treatment and a high tolerance to gibberellin in gynoecious lines. The data from one trial show an increasing response to gibberellin in concentrations up to 5000 parts per million (Table 1). Considerable vegetative distortion followed the 5000 parts per million treatment but many of the plants produced normal lateral branches. No serious vegetative injury resulted from a single application of 2000 parts per million.

In 1959 two 80-ft rows of a gynoecious inbred line, MSU 713-5, were grown in a screen isolation cage provided with a small hive of bees. One row was used to determine the number of foliar applications of 1500 parts per million necessary for adequate pollen and seed production under field conditions. Treatments, replicated three times on four-plant plots, were begun at the second true-leaf stage and ranged from one to four in number. The repeat applications were made at weekly intervals. At least 30 nodes of each plant were examined and classified for sex expression. The nontreated row of 74 plants produced no staminate flowers on more than 2000 nodes classified. A single initial application resulted in nine staminate flowers per 100 nodes and an average of 2.3 per plant. Two, three, and four applications resulted in 45, 66, and 71 staminate flowers per 100 nodes, respectively. Each application affected only two to four nodes per plant, beginning at about node 7 for the first applica-

Table 1. Staminate flower induction by foliar applications of gibberellin A_3 on gynoecious cucumber line MSU 713-21 grown in the field, 1959.

Treatment (ppm)	Total plants	Plants with one or more nodes bearing staminate flowers	Total nodes classified	Total nodes bearing staminate flowers	Staminate flowers per 100 nodes
Control	15	0	417	0	0.0
1000*	14	4	308	7	2.9
1000†	16	8	425	16	4.7
1500*	13	7	283	10	5.3
1500†	16	13	406	27	8.4
2000*	12	6	267	13	5.6
2000†	15	12	359	25	10.9
5000‡	15	10	337	23	9.5

* Applied at first true leaf stage and again 7 days later. † Applied at first true leaf stage and again 14 days later. ‡ Single application at the first true leaf stage.