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STUDIES ON MARIHUANA AND PYRAHEXYL COMPOUND [1]

By EDWIN G. WILLIAMS, *Senior Surgeon;* C. K. HIMMELSBACH, *Senior Surgeon;* ABRAHAM WIKLER, *Surgeon (R);* and DOROTHY C. RUBLE, *Psychologist;* with the technical assistance of BOLIVAR J. LLOYD, JR., *Scientific Aide; United States Public Health Service*

Recently there has been increased interest concerning the effects of marihuana. The Mayor of New York appointed a committee to investigate the problem in that city and a report of its studies has been published (*1*). These studies included examinations of synthetic substances developed by Professor Roger Adams at the University of Illinois. Through the courtesy of Dr. Adams this hospital was supplied with a quantity of one of these substances called pyrahexyl compound, which had been found to produce effects qualitatively similar to those produced by marihuana. The development of pyrahexyl compound gives the advantage of a substance which, if pharmacologically identical with marihuana, would lend itself admirably to studies of the marihuana problem, since dosage could be controlled. Aldrich (*2*) observed its influence on musical appreciation and Himmelsbach (*3*) evaluated its effect on the morphine abstinence syndrome. The results of both of these studies showed that pyrahexyl compound had no beneficial effect.

This paper deals with pharmacological, neurophysiological, psychiatric, and psychological studies [2] made on subjects ingesting pyrahexyl compound or smoking marihuana cigarettes.

Pyrahexyl Compound

Clinical Studies

Methods

Six prisoner patients who had formerly used marihuana were chosen for the pyrahexyl compound study involving prolonged use of the drug. They were quartered in the research ward of the institution

[1] From the Bureau of Medical Services, Research Department, U. S. Public Health Service Hospital, Lexington, Ky.

[2] The body hydration studies were made by Harris Isbell, Surgeon; psychiatric observations were made by James V. Lowry, Senior Surgeon, both of the U. S. Public Health Service.

in groups of 2, along with 8 or 10 patients undergoing studies concerning the effects of morphine. The fact that they were in the minority and the fact that there was mild antipathy between morphine users and marihuana users, is mentioned because it might have modified some of the psychological reactions observed in this group. Observations on temperature, pulse, respiration, body weight, caloric intake, and sleep were made three times daily for a 7-day period of preliminary observation, throughout the time they were taking the drug, and for a 7-day period following the discontinuation of the drug. Patients were observed at half-hour intervals throughout the 24 hours. If they were apparently sleeping on two consecutive observations they were credited with one-half hour of sleep. Pyrahexyl compound was given in self-chosen doses at self-chosen intervals for periods of from 26 to 31 days. The daily dose ranged from 60 to 2,400 mg. and was taken orally in from one to eight individual doses. The number of doses per day was not related to the total daily amount, one patient taking 1,200 mg. in one dose (the total for that day). Two men skipped one day each near the middle of the study.

Description of Patients

The six patients were between the ages of 26 and 33. None gave a history of having been physically dependent on opiates. All but one had used various narcotic drugs for pleasure.

All reported having smoked marihuana for periods of from 2 to 10 years with intervals of abstinence either enforced or voluntary. Five of the group were American-born citizens and one was a Puerto Rican. One had attended college 4 years, one for 2 years, two had graduated from high school, one had quit school at the eighth grade, and the school history on the Puerto Rican was vague.

Of these patients, one was a musician who had been employed regularly, one a professional dancer, two were salesmen, one was a laborer, and one a cook. All gave histories of having started using marihuana through associating with individuals who smoked it. They all stated that they could take it or leave it alone without discomfort.

Clinical Observations

About 3 hours after the initial dose there was drowsiness, euphoria, dryness of the mouth, injected sclerae, increased appetite, and swollen eyelids. There was spontaneous laughter, and some of the patients became markedly euphoric and garrulous. There was no gross ataxia. In all instances, there was dilatation of the pupils. At this time the men reacted slowly to questions and there was some apparent difficulty in expressing their thoughts. Most of them reported that this drug was similar in action to, but stronger than marihuana but stated that they preferred marihuana cigarettes. After the first 2 or 3 days the patients all showed loss of interest in their surroundings

and were unable to concentrate on any one thing for any appreciable length of time. After 4 to 6 days most of them seemed to be somewhat less affected by the drug than they had been on the first day or two. At this time all the patients asked for an increase in medication. This increased dosage was followed by a return of the effects. In one individual, on the twentieth day, the dosage was stabilized at 1,200 mg. per day, following which there was progressively less effect from the drug. One patient made it a point to remain semistuporous throughout the entire study. He stated that he would like to take the drug indefinitely. One patient who was usually hostile and irritable was happy and satisfied only when he was semistuporous. As the experiment progressed the patients became increasingly lethargic. In some individuals there were jerking movements during sleep. Toward the end of the study most of the patients complained of headache, dryness of the mouth, fatigue, and irritability in the early morning. At the end of the period of medication some of them stated that they would prefer staying on the drug for a longer period of time.

When administration of the drug was abruptly discontinued there was little evidence of abstinence during the first 2 days. On the third day, however, most of the patients became restless, slept poorly, had poor appetites, and reported "hot flashes." There was increased perspiration, and two individuals reported difficulty in swallowing. The reactions of two of the patients deserve detailed description. One (No. 635 of the marihuana study) exhibited evidence of a panic reaction. During the second day of withdrawal he was observed to tremble from time to time as though he were having a chill. He was markedly agitated, fearful, restless, and slept little. He became progressively worse and on the third day he was disoriented as to time and place. He exhibited marked mood swings, chewed his finger nails, cried, and complained of inability to swallow. These symptoms were abolished by pyrahexyl compound but returned after 4 or 5 hours. On the fourth day he lost emotional control, screamed, cried, and demanded his release. He was given successively 10 mg. of morphine, 3 gr. of nembutal, 120 mg. of pyrahexl, 3 gr. of luminal and finally 20 mg. of morphine before this reaction was brought under control. He was discharged from the study on the eighth day after withdrawal but was readmitted to the research ward for a period of observation because of continued anxiety. He remained on the ward at this time for a period of 3 days, during which his symptoms subsided without any special treatment. The other developed a hypomanic reaction which reached its maximum on the fourth day of withdrawal. This was characterized by overactivity, euphoria, increased psychomotor activity taking the form of dancing about by himself, bowing, singing, and effusive greeting which continued for 24 hours and was enhanced by smoking three marihuana cigarettes. This reaction had subsided completely by the eighth day after withdrawal.

Several measurable phenomena are plotted in figure 1. The average rectal temperature was lower during the administration of pyrahexyl compound than during the preliminary observation period. After withdrawal of the drug it returned to the control level. Pulse rate, after the initial rise, was definitely below the control level. After withdrawal it returned to the control level. Respiratory rate was definitely lower during the period of taking pyrahexyl than during the preliminary observation period and was not significantly altered following withdrawal. Systolic blood pressure was not altered during the period of pyrahexyl medication. The average body weight increased during the period of medication and returned to the control

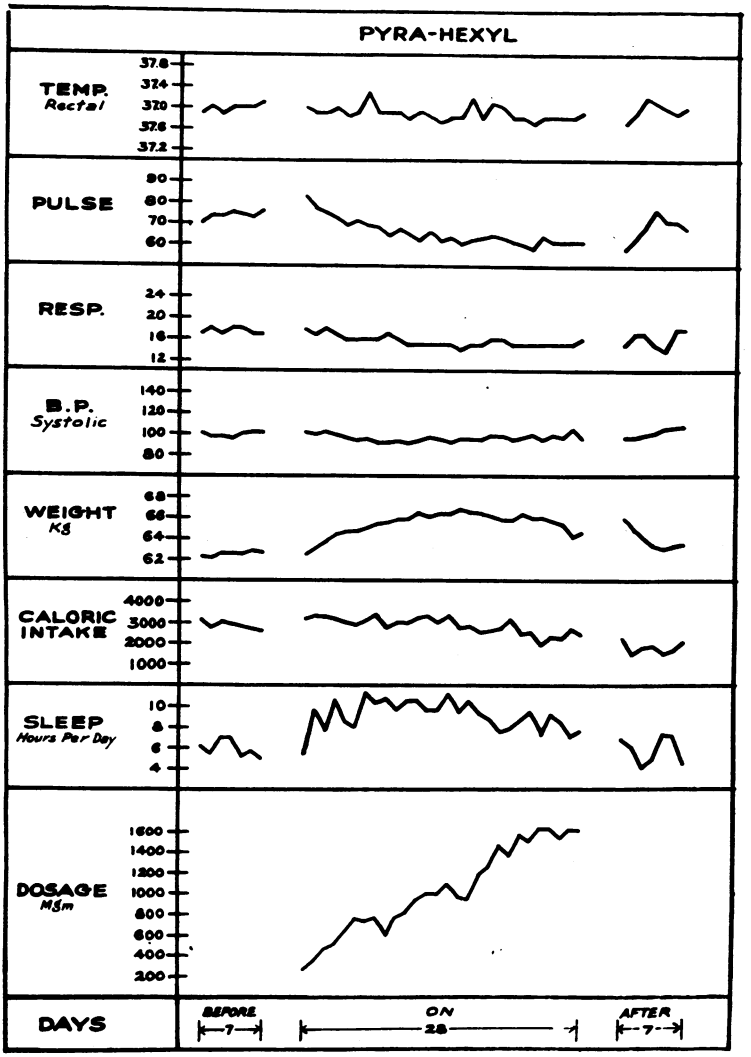

FIGURE 1.—Effect of continued pyrahexyl compound medication on physiological functions. (See text for discussion.)

level following withdrawal of the drug. Caloric intake increased slightly at the beginning of the period of medication and then decreased slightly but progressively until the end of the study, the caloric intake during the 7-day period following withdrawal being simply a continuation of the general decline seen from the beginning of the medication. Sleep was increased during pyrahexyl administration, particularly during the early part. During the latter part of the period of medication it became progressively less. After the drug was discontinued the hours of sleep were not significantly different from the control period. It is also noteworthy that the drug was taken in rapidly increasing amounts throughout the entire period, in accordance with the requests of the patients.

Psychological Studies

Methods

Certain psychological tests were given during the preliminary observation period, 2 weeks after medication was begun, and on the third day after it was discontinued. The tests used were:

Rorschach.
Wechsler-Bellevue.
Tapping speed.
Minnesota mechanical ability test.
Memory for digits (forward and backward).

All tests were given when there was subjective and objective evidence of the effects of the drug. In addition to the above tests the behavior rating scale devised by Felix (*4*) was used. This is a graphic type of rating scale in which the following six aspects of behavior are rated: Appearance, motor activity, mood, cooperation, speech, and herd.

Results

Rorschach analyses prior to the study indicated that these individuals were constricted, insecure, tense, and anxious. They had feelings of inadequacy and were emotionally immature. This type of Rorschach pattern is typical of the psychopath. Two of the six were extremely unstable emotionally; one of these had a schizoid personality with evidence of paranoid trends.

Analyses of the Rorschach records given during medication showed changes in the direction of a lessening of inhibitions and constrictions.

Pyrahexyl impaired intellectual functioning, but not to a marked degree. Total scores of the Wechsler-Bellevue showed little change. Analyses of results revealed difficulty in focusing attention upon the current topic and excluding other emotional content. Subjective reports are in disagreement with these findings. Subjects reported that it was easier to think, that the task seemed easier, that they were sure it improved their scores. The drug had little, if any, effect on rote memory. There was an increased output on tests involving

psychomotor activity but a loss in accuracy. Behavior rating data showed few changes in appearance or cooperation, except that patients who, during the preliminary observation period had been rather negativistic, became quite pleasant and cooperative. Motor activity on the whole decreased and they spent much time in bed. When awake they would talk for hours in a way suggestive of free association. Mood changes were in a positive direction and they were quite gregarious, trying to find anyone who would listen to them talk.

They stated that they were quite "high" but at no time was this fact grossly obvious.

Electroencephalographic Studies

The effects on the electroencephalogram of single doses and continued medication with pyrahexyl compound were studied in four and five patients respectively. All had been experienced marihuana users. The group on continuous pyrahexyl compound medication was the same as that described in previous sections of this report.

Methods

Standard electroencephalographic technique was employed. In the studies on the effects of continued pyrahexyl compound medication bipolar and monopolar leads were taken from the standard placements in the frontal, precentral, parietal, and occipital regions. In the single-dose studies bipolar and monopolar leads were taken from the occipital region only. The reference electrode for the monopolar recordings was placed on the ear. The electroencephalogram was a 4-channel resistance-capacity amplifier-oscillograph system with photographic recording on bromide paper. All recording was done in a darkened, air-conditioned, electrically shielded, soundproofed room, with the patient recumbent on a confortable bed. Movements were recorded by an observer who also exercised special care to prevent the subject from sleeping. In analyzing the records a representative 100-cm. (28.6 sec.) strip was selected and all waves over 5 microvolts were studied. Frequencies were measured only in groups of 3 or more similar waves. The average of 10 such measurements was taken as the mean frequency of the waves under consideration. Alpha frequencies and alpha percentages were calculated from bipolar occipital leads in all cases. The average deviation of the alpha frequency in any single record was found to be plus or minus 0.7 cycle per second. The average deviation of alpha percentage (the percent time that rhythms of alpha frequency are present) in any single record was approximately 12 percent.

In the single-dose studies control records were taken before the administration of the drug and the electrodes were left in place on the scalp. Pyrahexyl compound was then administered orally, and the patients were observed until it was apparent objectively that the drug had exerted its maximal effect, as evidenced by injection of the sclerae,

change in mood, talkativeness, and other alterations in behavior. This generally occurred 3 to 4 hours after ingestion of pyrahexyl compound. Electroencephalograms were then taken again, after readjustment of the electrode resistances to their control value. In the continued-dose studies electroencephalograms were made at various times during the day, but always after the patient had taken several doses of pyrahexyl that day.

Results

Single doses.—The effects of single doses of 120 and 30 mg. of pyrahexyl compound are shown in table 1. In six of the eight experiments, the alpha frequency did not change significantly. In the remaining two, the changes were in opposite directions. In four of the eight experiments the alpha percentage dropped significantly and in none of the remaining four was there a significant increase. In four of the experiments there was a definite although moderate increase in muscle activity recorded from monopolar leads. A typical record is shown in figure 2.

TABLE 1.—*Effects of single doses (120 and 30 mg.) of pyrahexyl compound on alpha frequency and alpha percentage of electroencephalogram*

Subject No.	Control		After pyrahexyl compound		
	Alpha frequency	Alpha percentage	Dose (mg.)	Alpha frequency	Alpha percentage
687	10.0	49	120	10.0	43
687	9.5	53	30	11.2	33
688	10.7	50	120	10.9	20
688	10.3	74	30	10.6	56
689	12.3	21	120	10.6	26
689	11.2	39	30	11.5	48
690	8.8	90	120	9.2	63
690	9.0	57	30	9.4	54

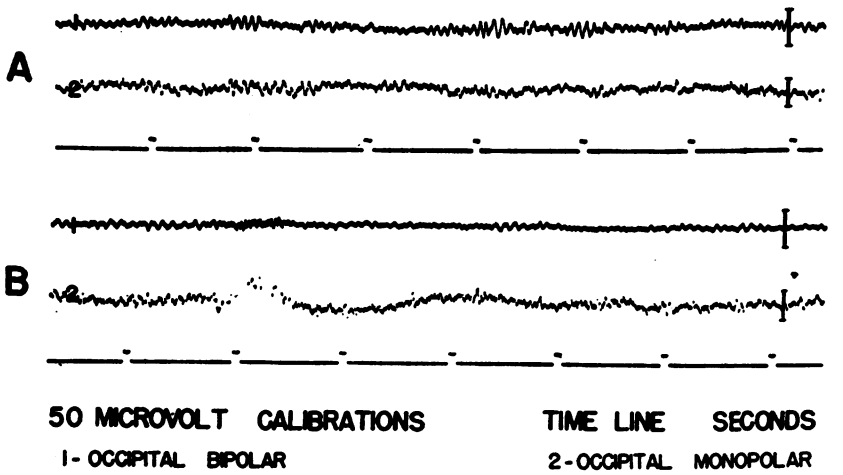

FIGURE 2.—Effects of single doses (120 mg.) of pyrahexyl compound on electroencephalogram. A. Control record. B. Three hours after oral administration of pyrahexyl compound. Note moderate increase in muscle activity recorded from monopolar leads.

Continued medication.—The electroencephalographic changes observed during continued pyrahexyl medication are shown in table 2.

TABLE 2.—*Effects of continued pyrahexyl medication on alpha frequency and alpha percentage of electroencephalogram*

Subject No.	Control		During continued pyrahexyl medication			
	Alpha frequency	Alpha percentage	Days on pyrahexyl	Dose level (mg. per day)	Alpha frequency	Alpha percentage
596	10.6	70	12	900	8.7	60
593	12.2	37	13	1,560	12.0	27
606	11.0	16	7	360	9.0	7
606			27	2,400	0 (continuous delta)	0
605	10.8	63	7	360	9.9	68
605			27	2,400	9.2	79
583	10.0	96	29	1,800	9.9	59

In three of the five subjects there was significant diminution in alpha frequency. The alpha percentage was increased in one and decreased significantly in two subjects, while in the remaining two the changes were within the limits of experimental error (i. e., less than 12 percent). In one (subject No. 606) of the two cases in which there was a diminution in alpha percentage the alpha was replaced by delta activity,

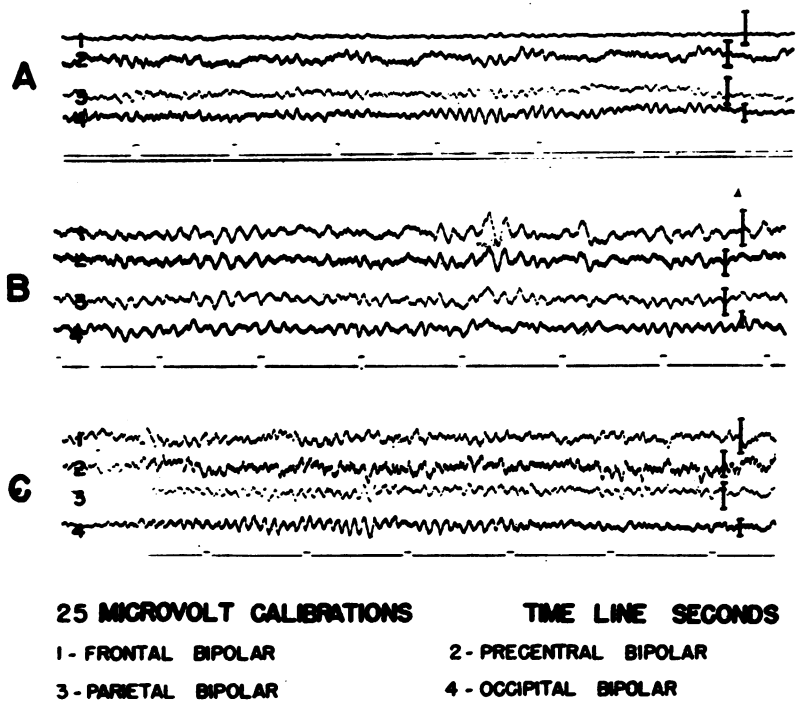

FIGURE 3.—Effects of continued pyrahexyl compound medication on electroencephalogram. A. Control. B. Twelfth day of continuous medication (dose level—900 mg. per day). C. Fourth day of withdrawal. Note marked slowing of dominant frequencies (4 to 6 per second) in B, and return to approximately normal pattern in C.

while in the other there was no replacement. Considerable delta activity also appeared in one record (subject No. 596) in which there was no significant over-all change in alpha percentage. A sample of this record is shown in figure 3. It is noteworthy that on the fourth day of withdrawal the electroencephalogram returned to the control pattern. Records taken 5 days after discontinuation of the medication in the other cases showed a complete restoration to the control pattern. Except for a transient increase in one case, muscle activity was not significantly altered during the test period.

Marihuana

Since there was some question as to whether the pyrahexyl compound was pharmacologically identical with marihuana, and especially since there was some evidence which might be interpreted as indicating physical dependence on the pyrahexyl compound, the study was continued using marihuana cigarettes instead of the pyrahexyl compound.

Clinical Studies

Methods

The marihuana was supplied by the Bureau of Narcotics, Washington, D. C. Its potency was not assayed, but the patients, all of whom were familiar with marihuana cigarettes, stated after smoking that it was "good weed." The ward routine was similar to that used in the first part of this study except that the ward was cleared of all patients other than those in the marihuana study. There was a 7-day period of preliminary observation, a 39-day period of marihuana smoking, and a 7-day period of postsmoking observation. Six patients were used for this portion of the study, three of whom had been subjects in the pyrahexyl study.

Description of Patients

Patient No. 635 (also a subject in the pyrahexyl study).—This 26-year-old white male was reared by an overindulgent, overprotective mother. At the age of 18 he began using morphine, but there is no definite evidence that he developed physical dependence. He was hospitalized later because of a schizophrenic illness for which he received shock therapy and was discharged after 1 year of hospitalization. At the age of 21 he was again hospitalized for 3 months because of alcoholism. Subsequent to this he occasionally used morphine and marihuana. He was an irritable individual, seclusive, defensive, cynical, manneristic, and above the average in intelligence. Impression: Emotionally unstable, schizoid individual, with definite paranoid trends.

Patient No. 638 (also a subject in the pyrahexyl study).—This 33-year-old white male was enuretic until the age of 11. He began a nomadic existence at the age of 14 when he left home because of

quarreling with his father. He had an interest in literature, music, and art, and at the age of 19 became a professional musician. He had been using marihuana since the age of 22. Although there is no history of overt homosexual behavior, he had definitely effeminate mannerisms of gait and speech. He became angry easily but met such situations by retreat. He appeared to be of about average intelligence. Impression: Psychopathic personality, emotional immaturity.

Patient No. 637 (also a subject in the pyrahexyl study).—This 27-year-old white male left home at the age of 15 and became a theatrical entertainer. He had been successful and saved part of his earnings. He was married three times, the first and second marriages being terminated by divorce. He began smoking marihuana at the age of 24 and continued until the time of his present hospitalization. He had taken an occasional injection of morphine, codeine, and heroin, but was never addicted. Impression: Psychopathic personality, emotional immaturity.

Patient No. 634.—This 24-year-old white male was a product of a broken home. His father was a bootlegger and the patient was raised by an aunt after the father was sent to prison. He had always earned his living by illegitimate means. He smoked marihuana for 4 years prior to admission to this institution and used morphine intravenously, intermittently, for 2 years prior to admission. He was an emotionally immature, pleasure-seeking individual. Impression: Psychopathic personality, emotional immaturity.

Patient No. 636.—This 26-year-old white male grew up in an intact home of marginal economic level. He left school at the age of 14 and worked as a salesman. He began the use of marihuana at the age of 15 and continued to smoke it until the time of his present commitment. He had taken a few injections of morphine and heroin. This patient was an emotionally immature, pleasure-seeking individual who had never assumed any social responsibility. Impression: Psychopathic personality, emotional immaturity.

Patient No. 639.—This 32-year-old white male had an antisocial criminal record which began at the age of 13. Most of his convictions were for burglary. He left home at the age of 18 and it was at this time that he began smoking marihuana. He had a history of homosexual activity. This man was a pleasure-seeking, irresponsible individual. Impression: Psychopathic personality, with antisocialism.

Clinical Observations

During the first few days of smoking marihuana the effects consisted of signs of exhilaration—the subjects became more talkative, there was an increase in psychomotor activity, they grinned and laughed a great deal, and one patient danced and waltzed about by himself. One patient became nauseated and vomited, but this did not seem to detract from his euphoria. Pupils were dilated, the

sclerae were injected and moist. Some of the group reported headaches, which they attributed to seeds ground up in the marihuana. One patient (No. 635), who was irritable and seclusive during the initial week of observation, became pleasant and seemed to take great pleasure in being agreeable with others. All had difficulty in concentration on any one thing for any appreciable length of time. They all had dry mouths and irritated throats. After this initial period of increase in activity all subjects showed decreased activity which persisted throughout the period of smoking. They were indolent, nonproductive, and showed neglect of personal hygiene. During periods of exhilaration they showed evidence of a mildly confused type of lassitude and their conversation was voluble and somewhat circumstantial at times. There was no gross interference with coordination; they all played ball in the yard, threw the ball hard and accurately, and caught it consistently. There was no hangover on awakening in the morning. One patient, who was given a work assignment in order to determine the effect of smoking marihuana on his work, lost interest and stopped work early in the experiment. Another, who styled himself as a painter in oils, brought with him some work which he said he would complete while undergoing the study. After the first day he abandoned his painting. Another patient, the musician, had stated that during the study he intended to do a great deal of practicing, but did practically none for the entire period of the study and stopped playing in the institution orchestra. During the last week of the smoking all the patients stated they would be glad when the study ended. One patient voluntarily limited his smoking to one marihuana cigarette during the last day of the period.

The period of smoking was stopped suddenly and completely and there were no objective signs of an abstinence syndrome. All of the patients reported that they were more "jittery" but this was not observed by any of the nurses or doctors. None of these patients showed any evidence of a toxic or other psychosis either during the smoking period or following cessation of smoking.

Certain objectively measurable phenomena are plotted in figure 4. Rectal temperature was increased slightly during the period of smoking as compared to the control period. After smoking it returned to the control level. The pulse rate was increased for the first 3 weeks of the smoking period, after which the rate was not significantly different from that of the preliminary period. After withdrawal no change in pulse rate was noted. Respiratory rate was not definitely affected by smoking. Systolic blood pressure was slightly increased during the period of smoking and this increase was maintained after withdrawal. Body weight increased during the period of smoking and returned to the control level following cessation of smoking.

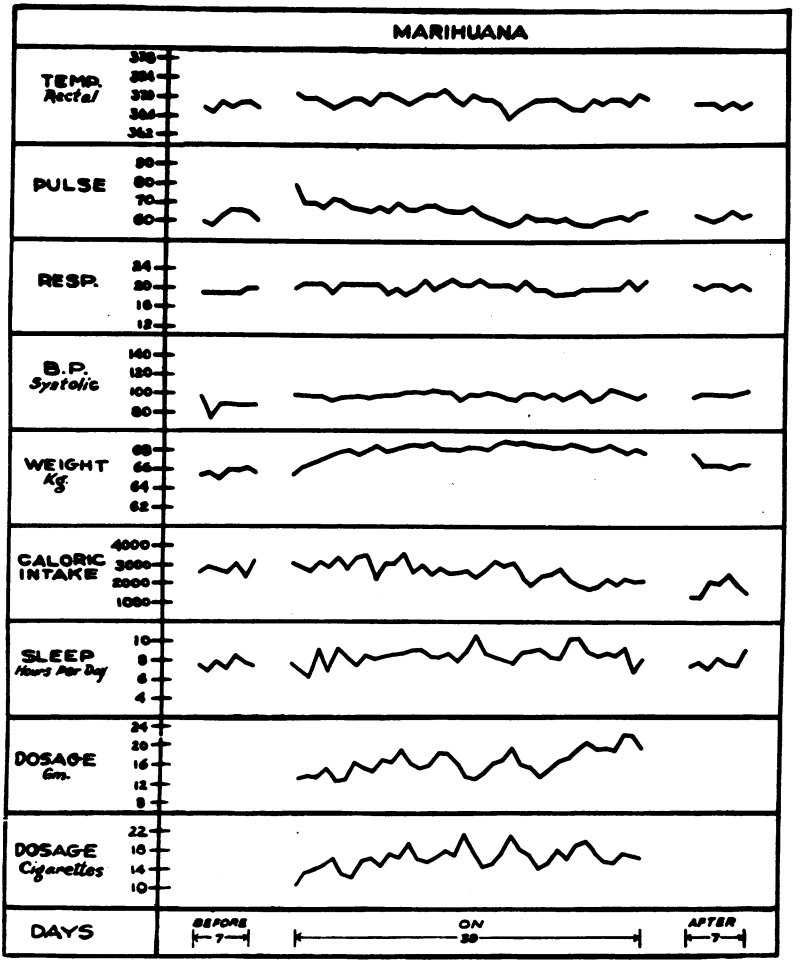

FIGURE 4.—Effects of daily smoking of marihuana cigarettes on physiological functions. (See text for discussion.)

Caloric intake increased slightly at the beginning of the period of smoking, then decreased gradually but progressively until the end of the study. The patients slept more during the period of smoking than during either the preliminary or postsmoking observation period. As to dosage, there was gradual fluctuating increase in smoking as the study progressed. With the exception of one man who smoked 1 cigarette per day, the number ranged from 9 to 26, with an average of 17 cigarettes per day.

Body Hydration Studies

Methods

Body hydration studies were made because of the observed increases in body weight without concomitant increase in caloric intake in the pyrahexyl studies.

Plasma volumes were determined by the method of Gibson and Evelyn (*5*); thiocyanate fluid volume by the method of Crandall and Anderson (*6*); hemoglobin by the method of Evelyn (*7*); hematocrits by the method of Wintrobe and Landsberg (*8*); blood and plasma specific gravity, and blood and plasma water according to the method of Williams (*9*). Total blood volume was calculated from the plasma volume and hematocrit readings. The extravascular (or extracellular) thiocyanate fluid volume was calculated by subtracting the total blood volume from the thiocyanate fluid volume. The results for plasma, blood, thiocyanate, and extravascular thiocyanate fluid volumes are all expressed in terms of milliliters per kilogram of body weight. Determinations were carried out in the week prior to smoking marihuana, 16 to 28 days after beginning to smoke marihuana, and 3 to 5 days after discontinuing smoking.

Results

Mean values of plasma, blood, and thiocyanate fluid volumes for the entire group are shown in table 3. No significant changes were found

TABLE 3.—*Effects of smoking marihuana cigarettes on plasma volume, blood volume, and thiocyanate fluid volume*

Period	Milliliters per kilogram of body weight		
	Plasma volume	Blood volume	Thiocyanate fluid volume
Before smoking	46.3 [1] ±5.29	88.3 [1] ±10.23	270.4 [1] ±15.6
While smoking	43.03 [1] ±5.28	87.6 [1] ±5.23	261.9 [1] ±27.6
After smoking	46.18 [1] ±3.05	88.7 [1] ±5.15	276.3 [1] ±31.8

[1] Standard deviations.

in these measures or in the other measures studied, regardless of whether the results were considered for individuals or for the entire group.

Psychological Studies

Methods

The following tests were given during the preliminary observation period, 2 weeks after smoking was begun, and on the third day after it was discontinued:

Rorschach.
Revised Stanford-Binet Scale (Form L).
MacQuarrie Test for Mechanical Ability.
Seashore Measure of Musical Talents.
Muller-Lyer Illusion Test.

At the second testing period all tests were given when there were subjective and objective evidences of the effect of marihuana smoking.

Results

Rorschach analyses prior to smoking marihuana indicated that these individuals were immature and constricted—Rorschach patterns typical of the psychopath. One had a schizoid personality with paranoid trends.

Analyses of tests given during medication showed changes in the direction of lessening of inhibitions, and constriction. There were fewer responses but these were more carefully elaborated. More original responses were given and more scoring determinants were used, especially in the bright-color area.

Marihuana impaired intellectual functioning as measured by the Stanford-Binet test. The following results are shown in terms of mean mental age: Before smoking, 16–8; while smoking, 16–2; after smoking, 16–10.

Analysis of data showed a greater scatter while on marihuana. Although the difference of 6 months between periods one (before smoking) and two (while smoking) was not great it was in the opposite direction from expectation on the basis of practive effects. The differences of 2 months between periods one (before smoking) and three (after smoking) were much less than would be expected on the basis of repetition.

During the second period (while smoking) easy items which previously had been answered correctly were missed, and items which before had given difficulty were answered correctly. This was probably due to the fact that difficult questions were remembered and the correct answers obtained from group discussions (this fact was later admitted), while easy items were missed because the individual was careless and found it difficult to concentrate and attend to the task at hand.

Performance on those subtests of the MacQuarrie Test for Mechanical Ability in which speed alone was the factor showed an increase. Loss in accuracy occurred in those tests in which coordination and manual skill were necessary.

The Seashore Measure of Musical Talents measures discriminations in differences in pitch, loudness, rhythm, time, timbre, and tonal memory. No improvement in musical ability was observed. The total number of errors for the three test periods was as follows: Before smoking, 741; while smoking, 790; after smoking, 757. Individual scores were consistent with these findings. However, all subjects reported that they thought their performances were better during the smoking period. Similar results have been reported by Aldrich (*2*).

In the Muller-Lyer Illusion Test the subject adjusts a variable line with diverging arrow points to equal a standard line with converging arrow points. The converging arrow points have a shortening effect and so the variable line is judged shorter than the standard.

Marihuana affected the judgment of the variable line. During the first and third period judgments consistently were too short. During the second period they were at times much too short and at others too long. Judgments were inconsistent, indicating carelessness on the part of the subject and no real attempt to make correct judgments. This represented a complete change in attitude on the part of the subjects, for during the other test periods they appeared to feel challenged by the task and made judgments carefully, adjusting and readjusting the variable line.

Neurophysiologic Studies

Effects of Smoking Marihuana Cigarettes on the Electroencephalogram

The effects of smoking 1 to 4 marihuana cigarettes on the electroencephalogram were studied in 22 experiments on 18 subjects. In addition, the electroencephalographic changes occurring during continued daily smoking of marihuana cigarettes were observed in 6 subjects.

Methods

The electroencephalographic technique was identical with that described in the pyrahexyl compound studies. In the single-dose studies, control records were taken and the patients were given one or more marihuana cigarettes and permitted to smoke them in the manner to which they were accustomed. Subsequent records were taken after the effects of the drug were manifest objectively by change in mood and behavior and injection of the scleral conjunctivae. Ten to sixty minutes elapsed between cessation of smoking and the recording of the electroencephalogram. In the continued daily smoking studies the records were taken some time during the day, after the patient had smoked several cigarettes at his usual rate.

Results

The effects of smoking marihuana cigarettes on alpha frequency are shown in figure 5. It is apparent that no significant uniform change

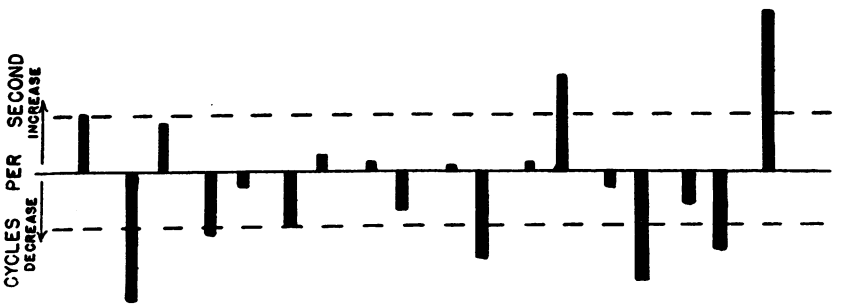

FIGURE 5.—Effects of smoking marihuana cigarettes (single studies) on alpha frequency of electroencephalogram. The broken line represents the average deviation from the mean in any single record. Note absence of any consistent significant effect.

occurred. The effects on the alpha percentage, however, were more significant and uniform, an average decrease of 19 percent being observed in eight cases while in only one instance was it increased (fig. 6). In all cases muscle activity recorded from monopolar leads was enhanced after smoking marihuana (fig. 7).

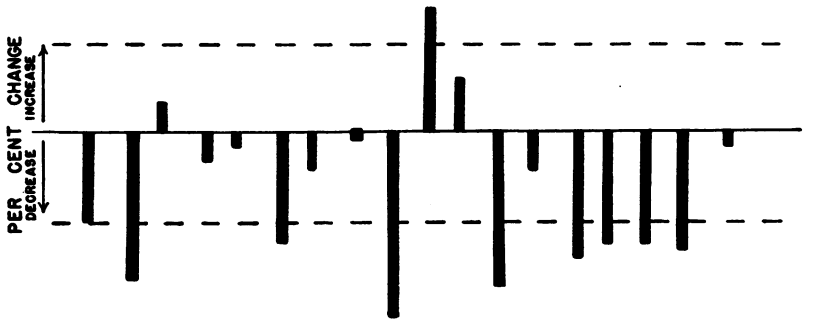

FIGURE 6.—Effects of smoking marihuana cigarettes (single studies) on alpha frequency of electroencephalogram. The broken line represents the average deviation from the mean in any single record. Note trend toward reduction in alpha percentage.

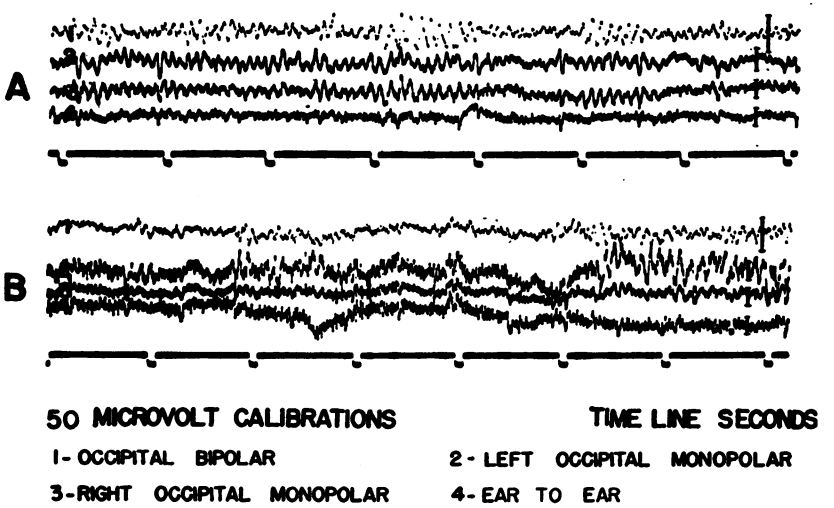

FIGURE 7.—Effects of smoking marihuana cigarettes (single studies) on electroencephalogram. A. Control. B. After smoking 3 marihuana cigarettes. Note reduction in alpha percentage and marked increase in muscle potentials recorded from monopolar leads.

The effects of continued daily smoking of marihuana on the electroencephalogram are shown in table 4. It is noted that in only one instance was the alpha frequency altered significantly. The changes in alpha percentage were not uniform, three showing significant increases and two decreases. Muscle activity was not markedly increased during continuous smoking of marihuana cigarettes (fig. 8).

Since the most striking change occurring after smoking 1 to 4 marihuana cigarettes (single studies) was the increase in muscle

TABLE 4.—*Effect of continued daily smoking of marihuana cigarettes on alpha frequency and alpha percentage of electroencephalogram*

Subject No.	Control		During continued marihuana smoking period			
	Alpha frequency	Alpha percentage	Days on marihuana	Number of cigarettes daily	Alpha frequency	Alpha percentage
634	9.5	45	36	17	9.0	79
638	8.8	46	34	17	8.9	47
636	8.8	80	35	11	9.3	58
639	12.0	40	29	14	11.5	66
635	10.8	63	7	10	10.3	82
637	10.0	96	34	9	7.5	77

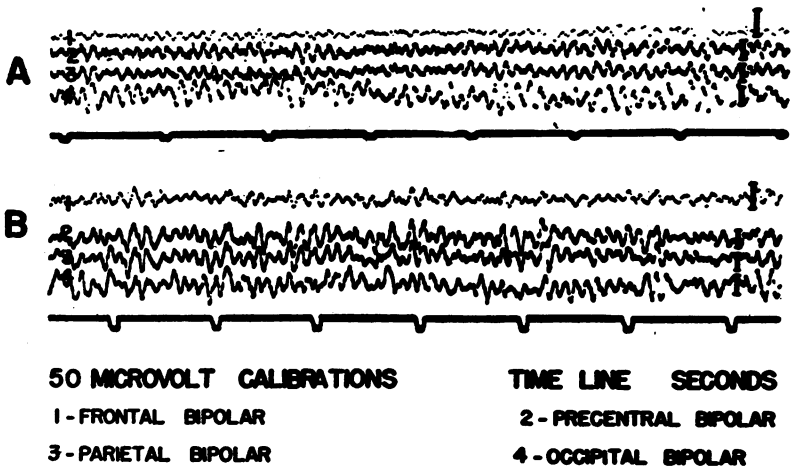

FIGURE 8.—Effects of continuous smoking of marihuana cigarettes on electroencephalogram. A. Control B. Thirty-fifth day of smoking marihuana cigarettes (average—16.8 cigarettes per day). Note absence o increased muscle activity.

activity recorded from monopolar leads, additional investigations were made to determine the origin of the potentials. Bipolar needle electrodes were inserted into the temporalis muscles under aseptic conditions in two patients and the muscle activity thus directly recorded was found to increase after smoking marihuana cigarettes. This demonstrated that the potentials were actually of muscular, not cortical origin. In a series of eight experiments the effects on the electroencephalogram of smoking ordinary commercial tobacco cigarettes were studied with particular reference to muscle activity recorded by monopolar leads. In all, a slight, but transient, increase was seen immediately after smoking. The magnitude and duration of the change, however, was much less than after smoking marihuana cigarettes (fig. 9). To determine whether the muscle effects were due to a peripheral or central action of the drug, three cats were made spinal by transection of the cord at the foramen magnum under ether anesthesia, artificial respiration being maintained by an automatic apparatus and a tracheal cannula. After recovery from anesthesia, cortical potentials were recorded from screw leads in the calvarium and muscle poten-

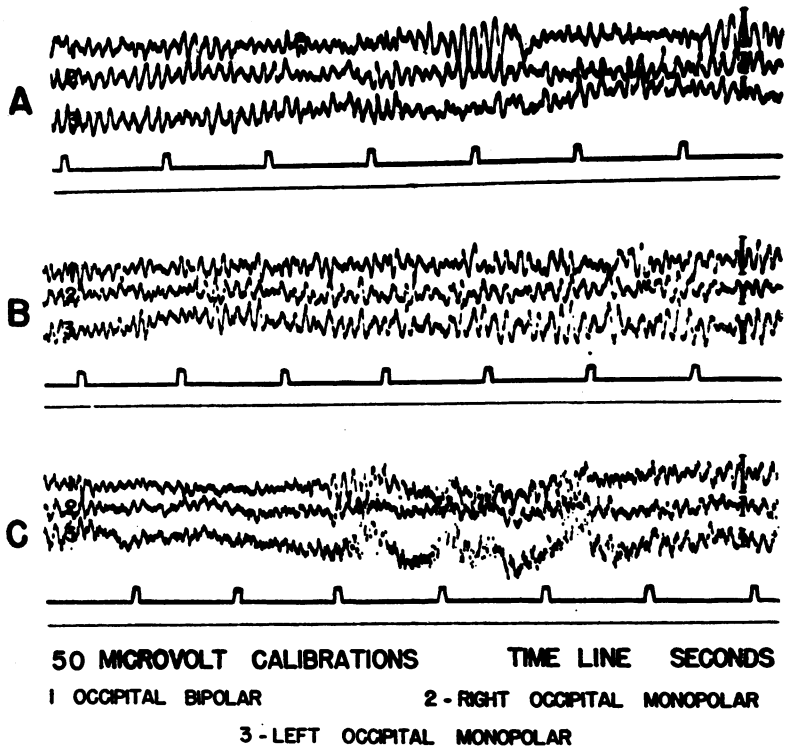

FIGURE 9.—Comparison of effects of smoking tobacco cigarettes and marihuana cigarettes on electroencephalogram. A. Control. B. Ten minutes after smoking 3 tobacco cigarettes. C. Ten minutes after smoking 2 marihuana cigarettes. Note absence of marked change in B, and marked increase in muscle potentials recorded from monopolar leads in C.

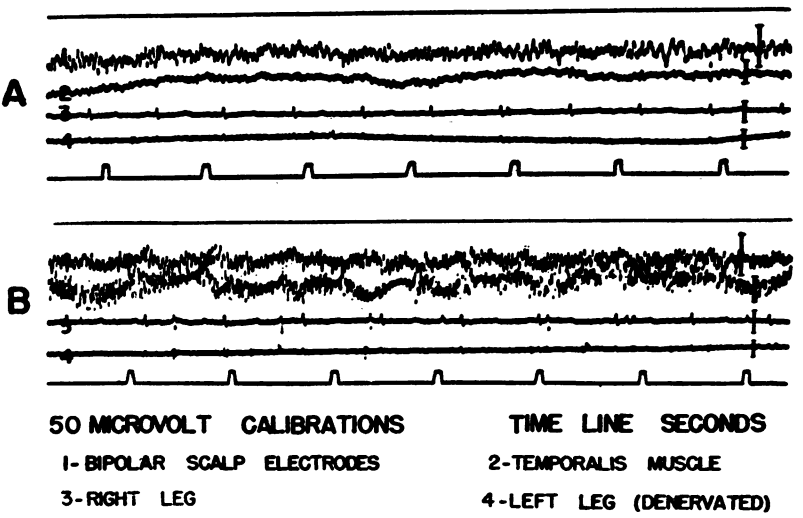

FIGURE 10.—Effects of breathing mixtures of marihuana smoke and air on electroencephalogram and muscle activity in acute spinal cat. A. Control. B. During breathing of marihuana smoke and air. Note disappearance of slower cortical rhythms in electroencephalogram, marked increase in muscle activity of intact temporalis muscle, and absence of increased muscle activity in hind-limb muscles.

tials from the intact temporalis muscle and both hind legs, one of which was denervated. After control records were taken, marihuana smoke was introduced into the air line at a constant rate. After several minutes the slower cortical rhythms (6 to 9 per second) disappeared and concurrently, spontaneous muscle activity increased in the temporalis muscle, but not in either of the hind legs (fig. 10). During inhalation of more concentrated marihuana smoke the cortical rhythms slowed markedly but since anoxia was probably a factor, the significance of these changes cannot be evaluated.

Effects of Smoking Marihuana Cigarettes on Sensation

Thresholds for touch, vibration sense, and two-point discrimination were studied in 6 subjects, olfactory thresholds in 3, and auditory acuity in 12, before and after smoking 2 or 3 marihuana cigarettes. Attempts to study the effects on pain thresholds with the Hardy-Wolff apparatus were unsuccessful because of the poor cooperation of the patients after smoking marihuana.

Methods

Touch thresholds were measured with a von Frey hair; vibration with the Roth "neurometer"; two-point discrimination with blunt pointed dividers; and smell with the Elsberg apparatus. The techniques employed have been described elsewhere (*10*). Time estimation was tested by requiring the patient, with eyes closed, to tell when he thought 20 seconds had elapsed after a prearranged signal. The time which actually elapsed was recorded by a stop watch. At no time was the patient informed of the accuracy of his estimate. Auditory acuity was measured by using earphones activated by current derived from a microvolter in a series with a Best frequency oscillator. Auditory thresholds, at frequencies of 1,000 and 2,000 cycles per second, were considered to have been obtained when the patient was just able to hear an intermittent tone, and were recorded in microvolts.

Results

No significant effects of marihuana were observed on thresholds for touch, vibration, two-point discrimination, or smell. Time estimation was impaired so that time appeared to pass more quickly (table 5). In 3 of the 12 subjects, a definite improvement in auditory acuity was observed, but no significant changes were noted in the remaining 9 cases, except in 1 patient who was very drowsy and whose auditory threshold was considerably increased.

Discussion

Of the six subjects participating in the continued pyrahexyl compound studies, two exhibited psychotic reactions which appeared during the withdrawal period. None of the six subjects participating

TABLE 5.—*Effect of smoking marihuana cigarettes (single studies) on time estimation*

Subject No.	Before marihuana		After marihuana	
	Time estimate (20 seconds)	Average deviation from mean	Time estimate (20 seconds)	Average deviation from mean
691	17.7	±2.43	9.0	±0.67
692	11.6	±1.06	12.0	±0
693	14.0	±.66	10.6	±.47
694	10.6	±1.8	8.8	±.4
695	11.4	±.93	13.0	±0
696	10.4	±.04	7.5	±.5

in the continued marihuana-smoking studies exhibited antisocial behavior or psychotic reactions. The principal early effects of marihuana or pyrahexyl compound were exhilaration and euphoria followed by general lassitude and indifference which resulted in carelessness in personal hygiene and lack of productive activity, which might be called social deterioration. In this sense, the use of marihuana corresponds in its social implications to opiate addiction and chronic alcoholism. It should be pointed out, however, that seldom, if ever, is marihuana smoked in such quantities or regularly for such periods of time as was done in the case of this study. Before the experiment started the patients estimated (and they certainly were not underestimating) that they would smoke from 6 to 10 cigarettes per day, stating that in civil life 3 good cigarettes would keep them "high" all day long. However, the fact that in isolated instances marihuana may produce bizarre effects of an antisocial nature is borne out by the following case:

The patient was a 28-year-old Puerto Rican. Psychiatric examination on admission to the institution revealed that he was distrustful and secretive, rather unstable emotionally, irresponsible and lazy, with poor judgment and insight. There was no evidence of psychosis and his intelligence was considered to be average. He was first used as a subject for the pyrahexyl studies, and following the withdrawal of pyrahexyl he was the one who developed a hypomaniac reaction. Subsequently he was again used as a subject in the studies of the effects of single doses of marihuana on auditory acuity. During the observation period just prior to the auditory acuity test his behavior was not unusual. After smoking three cigarettes auditory acuity was tested; he was asked to signal when he heard the first faint tone. He began to shout, "I hear, I hear," in a crescendo voice and became greatly agitated. He tore off the earphones, wept, and shouted accusations of persecution against the custodial supervisor which were definitely delusional. He protested loudly that he was innocent of all crimes and threatened anyone who would doubt it. During the entire course of this episode nothing provocative was said to him. The disturbance lasted for about an hour at the end of which time he vomited and became more calm. The test was discontinued and he was observed for several hours during which his emotional disturbance subsided and he was returned to the ward. Throughout the whole episode he was well oriented for person and place. It may be noted here that during the pyrahexyl studies his electroencephalogram showed bursts of very high amplitude

slow waves which were much larger, slower, and more periodic than that shown by any other subject (fig. 11).

The patients who were given pyrahexyl compound stated that this substance was quite similar to marihuana but they definitely preferred smoking marihuana cigarettes. This preference is probably because the effect of smoking cigarettes is immediate whereas the effect of pyrahexyl is delayed, and also because of pleasant memories associated with smoking marihuana.

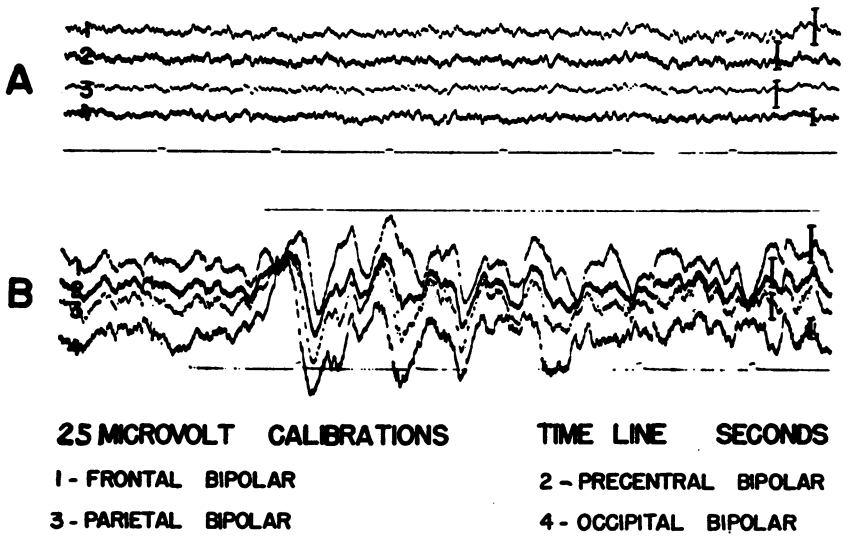

FIGURE 11.—Effects of continuous daily administration of pyrahexyl compound on electroencephalogram of patient who later developed acute transient psychotic episode after smoking marihuana cigarettes. A. Control. B. Twenty-seventh day of continuous medication with pyrahexyl compound (daily dose level—2,400 mg.). Note very large amplitude slow waves appearing in bursts.

The willingness of the patients to participate in these studies was probably the result of a desire to obtain marihuana or a marihuana-like compound and to demonstrate that marihuana is a harmless drug. The latter is an important factor in interpretation since if true they might have been trying to present as good an appearance as possible in order to create a favorable impression regarding marihuana. Another factor which is important in the interpretation is the fact that the study was conducted in a limited, protected environment, in an isolated part of the hospital where every effort was made to avoid unpleasant circumstances.

Marihuana smokers claim that smoking marihuana increases their productive activity, interest in work, and artistic ability. Under the conditions of the study no such effects were observed. The decrease in the pulse and respiratory rate in the pyrahexyl study, and the weight increase in both studies, perhaps can be attributed to the decreased activity and increased sleep during periods of medication as compared with the preliminary periods of observation or the 7-day

postmedication period. The greater effects observed during and especially following the pyrahexyl medication as compared with marihuana smoking probably can be attributed to the tremendous doses of pyrahexyl used. No attempt was made to compare accurately a dose of marihuana with a dose of pyrahexyl compound since the active principle of marihuana is not known and assays of the marihuana cigarettes were not made, but it is usually thought that 30 to 60 mg. of pyrahexyl compound are pharmacologically equivalent to one or two marihuana cigarettes.

The relatively slow and relatively slight increase in the number of cigarettes smoked suggests that rapid tolerance to marihuana does not develop. In both the pyrahexyl compound and the marihuana studies the initial loquaciousness and gaiety lasted only a few days and could be recaptured, if at all, only by increasing the dose. In this sense some tolerance was in evidence.

Only guarded statements can be made regarding the development of physical dependence from this study. Insofar as the pyrahexyl group is concerned, two of the six patients showed alterations in behavior during the week following withdrawal which might be interpreted as indicating dependence. Their symptoms were relieved by pyrahexyl or marihuana but it was not established that these substances constitute specific therapy. As regards the marihuana group, there is nothing that would indicate that they had developed physical dependence. The tension that the patients reported during the withdrawal period could be the result of their having spent much of their time smoking and now they were left without anything definite to do. One man voluntarily smoked only one cigarette on the last day of the smoking period, which he would not have done if physical dependence had developed.

The slowing of alpha and the appearance of delta activity which occurred during continued administration of large doses of pyrahexyl compound are similar to the changes produced by large doses of sedative drugs such as the barbiturates which in sufficiently large doses depress cortical electrical activity. The changes, therefore, cannot be considered specific for pyrahexyl compound. The effects were reversible in all cases, which suggests that no permanent change occurred in the central nervous system.

It is noteworthy that smoking of marihuana cigarettes and ingestion of single doses of pyrahexyl compound (30 to 120 mg.) produced similar results—mainly a lowering of alpha percentage without significant change in alpha frequency in a large proportion of the cases. Such changes are seen in normal subjects during mental efforts such as concentration, calculation, or attention. This suggests that smoking marihuana or taking pyrahexyl compound resulted in increased cerebral activity. Such an hypothesis is compatible with

the increase in recorded muscle potentials and the exhilarating effects which were observed to follow the use of these substances. After continued daily smoking of marihuana the effects on alpha percentage tended to disappear and this, too, appears to coincide with the absence of marked muscle activity on the electroencephalogram and diminution in the euphoric and exhilarating effects on the subjects.

The experiments on cats indicated that the increased muscle activity which was seen on the electroencephalogram after smoking marihuana was due to some effect of the drug on the central nervous system. An alternative explanation could be that the increased muscle potentials were due to reflex activity initiated by some effect of marihuana smoke on the respiratory system. This is unlikely because similar though less marked effects followed the ingestion of pyrahexyl compound, and because the increased muscle potentials were not marked during the continued daily smoking of marihuana.

A lack of effect of marihuana smoking on sensations in spite of evidence of marked effects on other types of cerebral functioning (e.g., time estimation) is not unique for this drug, since similar lack of effect on nonpainful sensations has been observed with morphine, barbiturates, alcohol, and acetylsalicylic acid (*10*). Alteration in ability to estimate time has been noted by other observers (*11*). Although the majority of our cases showed no changes in auditory acuity after smoking marihuana, lowering of the auditory threshold was striking in three and has been reported in the literature (*11*).

Summary and Conclusions

Single- and continued-dose studies were made on subjects who had been accustomed to smoking marihuana and who were serving sentences for violation of the Marihuana Tax Act.

Six subjects were studied for periods of from 26 to 31 days on *ad libitum* doses of the synthetic substance, pyrahexyl compound. At the beginning of the studies there was euphoria, dryness of the mouth, injected sclerae, increased appetite, swollen eyelids, and spontaneous laughter. There was no gross ataxia. Several days after the beginning of the medication the euphoria gave way to a general lassitude and carelessness in personal appearance and tidiness. No adverse behavior was manifested by any of the subjects during the period of medication. During this period pulse and temperature decreased and weight increased, presumably due to lessened activity. Psychological measurements were made with the Rorschach, Wechsler-Bellevue, Tapping Speed, Minnesota Mechanical Ability, and Memory for Digits Tests. These showed that comprehension and analytical thinking were made more difficult and an adverse effect was noted in accuracy on those tests which require concentration and manual

dexterity. Personality changes in the direction of lessened inhibitions were also observed. Individuals became more spontaneous and more responsive to external stimuli under the influence of pyrahexyl compound. Single doses of pyrahexyl compound (30 and 120 mg.) had little effect on the electroencephalogram. During prolonged medication, however, the dominant frequencies were markedly slowed. When the drug was withdrawn one of the patients manifested a panic state and another exhibited a hypomanic reaction.

Six patients were allowed to smoke marihuana cigarettes *ad libitum* for a period of 39 days; the principal early effects were exhilaration and euphoria. However, after several days this was replaced by general lassitude and indifference which resulted in carelessness in personal hygiene and lack of productive activity. In a subsequent study one patient developed a transient psychotic episode with paranoid reactions after smoking three marihuana cigarettes. The group as a whole showed a tendency to increase in body weight. Plasma volume, blood volume, and thiocyanate fluid volume were not altered in the patients during or following the period of smoking marihuana cigarettes. Psychologic changes were studied with the aid of the Rorschach, Revised Stanford-Binet Scale (Form L), MacQuarrie Test for Mechanical Ability, Seashore Measure of Musical Talents, and the Muller-Lyer Illusion Tests. The results were very similar to those produced by pyrahexyl compound. Musical ability was not improved despite a subjective feeling that such improvement occurred. Smoking a few marihuana cigarettes caused no change in alpha frequency of the electroencephalogram, but there was a distinct trend towards lowering of the alpha percentage and increase in recorded muscle activity. These changes were not present during continued daily smoking of marihuana cigarettes. The electroencephalographic changes thus appeared to parallel the observed changes in overt behavior, namely, initial stimulation followed by subsequent diminution of activity. Touch, vibration, two-point discrimination, and smell thresholds were not affected by marihuana, but time estimation was impaired and, in 3 out of the 12 subjects, auditory acuity was improved.

In conclusion, it appears that the changes produced by these drugs are related to lessening of inhibition and removal of restraint. In the majority of the cases observed by us under our experimental conditions, no antisocial acts were manifested. However, it is recognized that in certain social situations, persons who are very poorly adjusted may exhibit antisocial behavior as a result of the effects of marihuana. Although tolerance apparently developed with prolonged use of both pyrahexyl compound and marihuana, the presence of physical dependence was not established.

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COMPLEMENT-FIXATION TESTS FOR AMERICAN TRYPANOSOMIASIS IN TEXAS [1]

By DORLAND J. DAVIS, *Surgeon, United States Public Health Service*, and THELMA DE SHAZO SULLIVAN, *Bacteriologist, Texas State Department of Health*

During 1942, a large number of samples of human serum were examined by means of the complement-fixation reaction in an effort to secure data concerning the possible existence of American trypanosomiasis (Chagas' disease) among the population of Texas. Although proved cases had not at that time been reported in the United States, the presence of reduviid bugs infected with *Trypanosoma cruzi* in Texas (*1*) suggested the possibility of human infection. The complement-fixation tests were done in the laboratories of the Texas State Department of Health; the antigen employed was prepared by freezing a concentrated culture of the Panama strain of *T. cruzi* (*2*). The specificity and sensitivity of this type of antigen has been confirmed recently by studies in Brazil (*3*) of acute and chronic cases.

A total of 1,909 samples of human serum from different parts of the State were tested. Of this number, 568 specimens were collected

[1] From the Division of Infectious Diseases, National Institute of Health, and the Bureau of Laboratories, Texas State Department of Health.

from rural residents of Cameron, Hidalgo, Kinney, Uvalde, Webb, and Zavala Counties, mostly from school children of Mexican extraction, 85 percent of the group being under 20 years of age. This group was selected because a large proportion of them lived in shelters made of brush and cattails which afforded harborage for triatomid bugs, the carriers of *T. cruzi*. The only serum found to fix complement in significant dilution was from an 8-year-old boy living in Blewett, Uvalde County. Many specimens of *Triatoma gerstaeckeri* captured in this vicinity were found to be infected with the trypanosome. The boy was examined medically, and desert mice were inoculated with his freshly drawn blood, but no further evidence was obtained to indicate that he was infected.

One thousand and two Kline-negative samples sent to the laboratory by Selective Service Examination Boards, principally from counties in which *T. cruzi* had been demonstrated in insects, were all negative. In addition, complement-fixation tests were performed on 339 samples which had been sent to the laboratory by practicing physicians and found negative for the routine diagnostic tests requested. None of these serums fixed complement in the presence of *T. cruzi* antigen.

SUMMARY

On the basis of this evidence it appears that American trypanosomiasis, if present at all, is extremely rare in Texas.

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VIABILITY OF DRIED *BACTERIUM TULARENSE* [1]

By Russell P. Miller, *Senior Scientific Aide, United States Public Health Service*

Storage of stock bacterial cultures dried in vacuum and sealed in glass ampules has become a routine practice. Report is here made of successful application of the method for 4 years to culture 38 of *Bacterium tularense*.

This culture was isolated from a human case of tularemia in Utah in 1920 and has been carried for many years on blood-dextrose-cystine agar at about 5° C., with frequent transfer to fresh medium, but with-

[1] From Biologics Control Laboratory, National Institute of Health.

out animal passage. The stock culture has received wide distribution to diagnostic laboratories throughout the United States and elsewhere because it has been long nonvirulent.

In June 1942 a culture was suspended in a mixture of beef infusion, cystine, and cooked rabbit's blood. Without delay, small portions of the mixture were transferred to small glass ampules, frozen in methyl cellosolve and dry ice, dried in vacuum, sealed in a flame, and stored in a covered wooden box on top of the laboratory desk at room temperature.

In April 1946 an ampule was opened and the contents planted on the surface of a slanted tube of blood-dextrose-cystine-agar and incubated at 37° C. During 7 days of observation no growth could be seen on the culture medium. The tube was then transferred to room temperature and after 48 hours innumerable small colonies covered the entire surface of the medium. A loopful of the colonies was transferred to fresh medium resulting in a luxuriant growth which was further propagated. The growth was removed, suspended in physiological saline solution, and was agglutinated out to the full titer (1:2,560) of a known antitularense serum.

DEATHS DURING WEEK ENDED JUNE 22, 1946

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 22, 1946	Corresponding week, 1945
Data for 92 large cities of the United States:		
Total deaths	7,940	8,529
Average for 3 prior years	8,232	
Total deaths, first 25 weeks of year	220,351	216,106
Deaths under 1 year of age	603	578
Average for 3 prior years	585	
Deaths under 1 year of age, first 25 weeks of year	14,485	14,467
Data from industrial insurance companies:		
Policies in force	67,219,482	67,379,078
Number of death claims	11,322	12,544
Death claims per 1,000 policies in force, annual rate	8.8	9.7
Death claims per 1,000 policies, first 25 weeks of year, annual rate	10.3	10.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 29, 1946

Summary

Increased incidence of poliomyelitis was reported for the week in all of the 9 geographic divisions except the New England, South Atlantic, and East South Central areas. The increases ranged from 4 in the Pacific area to 25 in the West South Central. A total of 273 cases was reported, as compared with 204 last week, 220 for the week in 1944 (the highest incidence for a corresponding week in the past 5 years) and a 5-year (1941–45) median of 156. Of the 13 States reporting more than 6 cases, only Florida reported a decrease. These States are as follows (last week's figures in parentheses): New York 14 (7), Ohio 7 (2), Illinois 18 (12), Minnesota 10 (1), Missouri 8 (1), Georgia 8 (4), Florida 21 (34), Arkansas 8 (1), Louisiana 13 (8), Oklahoma 10 (5), Texas 52 (44), Colorado 25 (11), California 22 (18). The cumulative total, 1,856, as compared with 1,271 for the corresponding period last year, is more than reported for any previous corresponding period since 1934. The total since March 16 is 1,390, as compared with 874 for the corresponding period last year.

Six cases of smallpox were reported (the same number as for last week), 1 each in New Jersey (nonresident), Indiana, Illinois, Kentucky, Arkansas, and Oklahoma. The total for the year to date is 254, as compared with 245 for the same period last year and a 5-year median of 568.

Of 218 cases of diphtheria, as compared with 222 last week, South Carolina reported 44, Texas 24, and California 15. The total to date, 8,421, as compared with 6,739 for the corresponding period last year and a 5-year median of 6,314, is more than reported for any corresponding period since 1939.

Other diseases with cumulative figures above those for the same period last year are as follows (last year's corresponding figures in parentheses): Amebic dysentery 1,443 (841), infectious encephalitis 236 (180), influenza 188,206 (66,474), measles 612,397 (91,193), Rocky Mountain spotted fever 170 (153), tularemia 471 (405).

Deaths recorded for the week in 93 large cities of the United States totaled 8,557, as compared with 8,628 last week, 8,747 and 8,476, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943–45) average of 8,884. The cumulative figure is 248,525, as compared with 243,311 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended June 29, 1946, and comparison with corresponding week of 1945 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945	
NEW ENGLAND												
Maine	1	1	0				101	2	95	0	0	1
New Hampshire	0	0	0				22	15	9	0	1	0
Vermont	1	0	0				139	22	55	0	0	0
Massachusetts	3	6	1				1,351	315	457	2	5	4
Rhode Island	0	0	0		25		84	6	20	0	1	0
Connecticut	0	2	0		1		268	54	141	2	1	2
MIDDLE ATLANTIC												
New York	10	13	13	[1] 4	[1] 1	[1] 3	1,563	152	611	6	17	17
New Jersey	4	2	2	4	1	3	811	48	344	1	3	3
Pennsylvania	7	3	7				785	407	390	10	8	6
EAST NORTH CENTRAL												
Ohio	10	9	7		1	2	613	35	90	6	6	4
Indiana	4	5	4		6	6	95	16	37	0	3	1
Illinois	9	0	11		3	3	254	373	373	5	7	6
Michigan [2]	4	11	6		4		279	181	259	2	11	11
Wisconsin	0	1	1	10	1	7	1,066	93	789	1	4	1
WEST NORTH CENTRAL												
Minnesota	0	2	2				22	9	66	3	1	1
Iowa	5	4	1				120	49	51	3	4	0
Missouri	8	2	1		2	1	46	36	36	1	3	3
North Dakota	0	7	0	3	2		13	1	9	0	0	0
South Dakota	0	2	1				7	15	6	0	1	0
Nebraska	0	1	1		1		58	7	20	1	0	1
Kansas	3	4	3	1	1		34	29	63	2	1	1
SOUTH ATLANTIC												
Delaware	0	0	0				7	2	4	0	0	0
Maryland [2]	6	5	3				326	9	65	0	6	5
District of Columbia	0	0	0				64	1	30	0	0	0
Virginia	6	2	4	70	74	56	336	21	61	7	4	4
West Virginia	5	2	2	2	9	2	282	4	31	0	0	1
North Carolina	10	7	4			1	115	46	122	0	5	3
South Carolina	44	9	6	104	53	64	163	19	34	0	3	2
Georgia	2	1	3	1	62	3	64		25	0	1	1
Florida	3	1	2	1		1	8	10	22	1	1	2
EAST SOUTH CENTRAL												
Kentucky	3	3	1			1	17	39	31	1	0	1
Tennessee	4	1	2	7	3	4	54	20	35	3	4	1
Alabama	6	3	3	17	6	6	62	1	16	6	10	2
Mississippi [2]	7	8	3							0	2	0
WEST SOUTH CENTRAL												
Arkansas	0	2	2	2	2	2	49	27	28	0	5	0
Louisiana	1	5	4			1	53	46	15	0	2	1
Oklahoma	0	3	1	2	9	9	67	14	39	1	0	0
Texas	24	28	18	214	338	264	441	208	196	4	9	6
MOUNTAIN												
Montana	0	0	0				60	4	15	0	1	1
Idaho	0	1	0				14	3	7	1	0	0
Wyoming	0	0	0				2	4	14	1	0	0
Colorado	6	5	5		12	11	130	8	61	0	1	1
New Mexico	1	6	3	2	1		33	6	11	0	0	0
Arizona	2	0	0	9	38	38	56		18	0	1	0
Utah [2]	1	1	0	3			74	205	50	0	1	1
Nevada	0	0	0					1	2	0	0	0
PACIFIC												
Washington	0	10	4		2	1	55	185	137	3	2	2
Oregon	3	10	2		1	3	123	33	46	1	0	0
California	15	18	16	5	13	15	654	667	667	7	9	9
Total	218	206	159	461	672	672	11,038	3,448	6,333	81	144	144
26 weeks	8,421	6,739	6,314	188,206	66,474	78,126	612,397	91,193	509,829	3,964	5,419	5,419

[1] New York City only.

[2] Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended June 29, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [2]		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945		June 29, 1946	June 30, 1945	
NEW ENGLAND												
Maine	0	0	0	10	28	7	0	0	0	0	1	1
New Hampshire	0	0	0	3	2	2	0	0	0	1	0	0
Vermont	0	0	0	4	6	3	0	0	0	0	0	0
Massachusetts	0	2	0	91	104	147	0	0	0	24	4	4
Rhode Island	0	0	0	1	2	5	0	0	0	1	0	1
Connecticut	1	1	0	14	20	22	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York	14	16	4	204	309	176	0	0	0	6	3	3
New Jersey	3	5	1	70	32	37	[4] 1	0	0	0	0	1
Pennsylvania	2	1	1	96	161	113	0	0	0	3	3	8
EAST NORTH CENTRAL												
Ohio	7	5	1	119	126	86	0	0	0	6	4	4
Indiana	2	3	0	21	29	20	1	0	0	1	3	3
Illinois	18	2	2	77	114	62	1	0	1	5	2	2
Michigan [3]	3	0	0	74	104	85	0	0	0	3	2	2
Wisconsin	1	0	0	48	82	68	0	1	0	1	0	0
WEST NORTH CENTRAL												
Minnesota	10	1	1	16	42	29	0	0	0	0	0	0
Iowa	3	1	0	15	21	15	0	0	0	0	0	0
Missouri	8	2	1	8	15	12	0	0	0	2	1	2
North Dakota	0	0	0	2	9	3	0	2	0	5	0	0
South Dakota	3	0	0	2	1	4	0	0	0	0	1	0
Nebraska	1	0	0	3	10	8	0	0	0	13	0	0
Kansas	5	1	1	22	41	17	0	0	0	3	0	3
SOUTH ATLANTIC												
Delaware	0	1	0	1	1	1	0	0	0	1	0	0
Maryland [3]	0	1	0	21	31	24	0	0	0	0	0	1
District of Columbia	0	3	0	4	13	7	0	0	0	0	2	0
Virginia	0	5	2	39	45	13	0	0	0	6	15	4
West Virginia	1	2	0	11	26	13	0	0	0	2	3	2
North Carolina	3	5	1	9	32	12	0	0	0	2	4	4
South Carolina	1	8	2	3	2	2	0	0	0	5	9	5
Georgia	8	1	1	3	1	7	0	0	0	5	6	9
Florida	21	1	1	3	4	4	0	0	0	5	18	4
EAST SOUTH CENTRAL												
Kentucky	4	3	3	6	19	19	1	0	0	0	3	8
Tennessee	6	6	1	3	13	13	0	0	0	5	10	10
Alabama	6	7	1	4	5	5	0	0	0	5	9	3
Mississippi [3]	3	0	2	4	2	3	0	0	0	3	4	4
WEST SOUTH CENTRAL												
Arkansas	8	1	3	1	7	2	1	0	0	3	3	7
Louisiana	13	2	2	3	5	5	0	0	0	3	2	6
Oklahoma	10	3	2	5	18	4	1	1	0	0	1	1
Texas	52	54	5	23	48	28	0	0	0	12	15	17
MOUNTAIN												
Montana	0	0	0	3	2	6	0	0	0	0	1	1
Idaho	1	0	0	2	0	1	0	0	0	4	1	1
Wyoming	0	0	0	0	5	5	0	1	0	0	1	0
Colorado	25	0	1	39	17	17	0	0	0	0	1	1
New Mexico	1	0	0	3	5	2	0	0	0	0	1	2
Arizona	1	0	0	8	10	8	0	0	0	0	2	0
Utah [3]	3	0	0	8	10	10	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	3	0	0	18	21	21	0	0	0	1	0	1
Oregon	0	1	0	20	17	8	0	0	0	0	0	1
California	22	12	12	79	188	110	0	0	0	2	0	4
Total	273	156	156	1,223	1,805	1,415	6	5	8	138	136	141
26 weeks	1,856	1,271	1,002	82,114	127,915	92,168	254	245	568	1,586	1,742	2,115

[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever reported separately, as follows: Massachusetts, 23; Rhode Island, 1; Michigan, 1; South Carolina, 1; Georgia, 1; Florida, 3; Texas, 2.
[4] This case reported in Trenton for week ended June 22 (see p. 1090).

Telegraphic morbidity reports from State health officers for the week ended June 29, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough			Week ended June 29, 1946							
	Week ended—		Median 1941–45	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	June 29, 1946	June 30, 1945		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	10	100	19								
New Hampshire	11										
Vermont	21	11	11								1
Massachusetts	146	107	107		2						
Rhode Island	25	28	28								
Connecticut	39	53	47		1						2
MIDDLE ATLANTIC											
New York	111	258	270	4	4		1	1		1	2
New Jersey	130	174	174	1							
Pennsylvania	80	214	237								3
EAST NORTH CENTRAL											
Ohio	72	127	227				1		1		3
Indiana	23	33	33					1			8
Illinois	92	81	117	5			1		1		15
Michigan [3]	126	44	122	1							2
Wisconsin	135	48	129	1					2		8
WEST NORTH CENTRAL											
Minnesota	5	7	34								3
Iowa	35	1	27	1							59
Missouri	15	23	29								
North Dakota	2		5			1					
South Dakota		4	4								1
Nebraska	6	2	7								
Kansas	33	17	54	1			1				2
SOUTH ATLANTIC											
Delaware	1		1					3			
Maryland [3]	21	70	79			1	1	1			1
District of Columbia	13	22	22								
Virginia	80	67	67			171		3			4
West Virginia	53	24	24								1
North Carolina	159	287	275					2	1		
South Carolina	74	96	96	2	44			1		2	3
Georgia	47	19	18		9			1	1	16	1
Florida	36	3	11	6						6	
EAST SOUTH CENTRAL											
Kentucky	17	44	69								
Tennessee	28	30	58		1	1		1	2	1	1
Alabama	32	21	30				1		3	6	5
Mississippi [3]									1	3	4
WEST SOUTH CENTRAL											
Arkansas	14	10	19	2					14		
Louisiana		3	3							5	4
Oklahoma	8	22	16					1			1
Texas	249	264	264	397	46	64				27	10
MOUNTAIN											
Montana	3	4	13								
Idaho	3	9	4								
Wyoming	32		4				1				
Colorado		28	28	1			1				
New Mexico	17	8	8			1					
Arizona	7	11	12			32					3
Utah [3]	13	31	63					1	2		3
Nevada											
PACIFIC											
Washington	23	11	50								1
Oregon	55	17	20	1		1					
California	50	240	202	3	5		3			3	4
Total	2,152	2,673	3,237	426	112	272	11	16	28	70	155
Same week, 1945	2,673			48	703	210	6	26	15	127	116
Average, 1943–45	2,963			57	717	283	10	[4] 25	16	[4] 82	
26 weeks: 1946	49,215			1,443	8,748	3,269	236	170	471	1,325	2,396
1945	65,092			841	11,684	3,307	180	153	405	1,598	2,425
Average, 1943–45	72,870		[4] 98,514	852	8,961	2,644	251	[4] 184	394	[4] 1,286	

[3] Period ended earlier than Saturday.
[4] 5-year median, 1941–45.

Leprosy: Florida 1 case; California 1 case.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 22, 1946

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	41	0	2	0	1	0	0	4
New Hampshire:												
Concord	0	0	------	0	-------	0	2	0	1	0	0	------
Vermont:												
Barrens	0	0	------	0	-------	0	0	0	1	0	0	------
Massachusetts:												
Boston	5	0	------	0	171	2	3	0	30	0	0	14
Fall River	0	0	------	0	34	0	1	0	6	0	0	------
Springfield	0	0	------	0	81	0	0	0	1	0	0	6
Worcester	1	0	------	0	204	0	5	0	2	0	4	54
Rhode Island:												
Providence	0	2	1	0	86	0	1	0	2	0	0	12
Connecticut												
Bridgeport	0	0	------	0	2	0	1	0	1	0	0	------
Hartford	0	0	------	0	1	0	1	0	3	0	0	2
New Haven	0	1	------	0	50	0	0	0	0	0	0	------
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	1	10	0	7	0	6	0	0	5
New York	9	1	2	1	432	7	27	3	96	0	4	37
Rochester	0	0	------	0	65	0	0	0	14	0	3	------
Syracuse	0	0	------	1	4	0	0	1	9	0	0	------
New Jersey:												
Camden	0	0	------	0	6	0	1	0	3	0	0	4
Newark	0	0	------	0	39	0	3	0	6	0	0	20
Trenton	0	0	------	0	50	1	1	0	2	*1	0	5
Pennsylvania:												
Philadelphia	8	0	1	0	89	1	16	0	34	0	2	10
Pittsburgh	1	0	------	0	30	2	7	0	14	0	0	5
Reading	1	0	------	0	-------	0	0	0	1	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	1	12	1	5	2	7	0	0	9
Cleveland	0	0	------	0	227	4	4	0	19	0	0	14
Columbus	1	0	------	0	8	0	0	0	4	0	0	2
Indiana:												
Fort Wayne	0	0	------	0	2	0	1	0	1	0	0	1
Indianapolis	0	0	------	1	19	2	2	0	3	0	0	4
Terre Haute	0	0	------	0	9	0	1	0	1	0	0	------
Illinois:												
Chicago	0	0	1	0	67	2	18	0	49	0	1	34
Springfield	0	0	------	0	-------	0	1	0	1	0	1	------
Michigan:												
Detroit	3	0	------	0	42	0	3	1	34	0	1	27
Flint	0	0	------	0	-------	0	2	0	2	0	0	3
Grand Rapids	0	0	------	0	29	1	0	0	3	0	0	6
Wisconsin:												
Kenosha	0	0	------	0	58	0	0	0	0	0	0	------
Milwaukee	0	0	1	1	147	1	3	0	11	0	1	45
Racine	0	0	------	0	175	0	0	0	4	0	0	------
Superior	0	0	------	0	5	0	0	0	2	0	0	16
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	4	0	0	0	1	0	0	1
Minneapolis	3	0	------	0	11	0	6	1	15	0	0	------
St. Paul	1	0	------	0	10	2	1	0	3	0	1	8
Missouri:												
Kansas City	2	0	------	0	-------	0	10	0	1	0	1	3
St. Joseph	0	0	------	0	2	0	0	0	1	0	0	------
St. Louis	0	1	1	0	61	0	10	3	6	0	0	2

*Nonresident.

City reports for week ended June 22, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza cases	Influenza deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	4	0	------	0	5	0	1	1	2	0	0	------
Kansas:												
Topeka	0	0	------	0	1	0	1	0	3	0	0	13
Wichita	0	0	1	0	8	0	1	2	3	0	0	4
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	8	0	1	0	0	0	0	------
Maryland:												
Baltimore	7	0	1	1	390	2	5	0	5	0	0	16
Cumberland	0	0	------	0	1	0	0	0	4	0	0	------
Frederick	0	0	------	0	1	0	1	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	91	2	4	0	7	0	0	9
Virginia:												
Lynchburg	0	0	------	0	5	0	0	0	1	0	0	------
Richmond	0	0	------	0	43	0	3	0	5	0	0	8
Roanoke	0	0	------	0	2	0	0	0	0	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	0	0	0	------
Wheeling	1	0	------	0	------	0	1	0	0	0	0	20
North Carolina:												
Raleigh	0	0	------	0	------	0	2	0	2	0	0	2
Winston-Salem	0	0	------	0	16	0	1	0	0	0	0	14
South Carolina:												
Charleston	0	0	------	0	6	0	1	*1	0	0	0	------
Georgia:												
Atlanta	0	0	1	1	18	0	1	0	1	0	0	------
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	------	0	7	0	1	0	0	0	0	------
Florida:												
Tampa	1	0	------	0	6	0	2	5	1	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	------	0	15	0	10	0	1	0	0	11
Nashville	0	0	------	1	------	0	2	0	0	0	0	------
Alabama:												
Birmingham	0	0	------	0	2	0	2	0	2	0	1	------
Mobile	0	0	1	0	6	0	0	1	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	2	0	1	0	0	0	0	------
Louisiana:												
New Orleans	0	0	------	0	15	0	5	*8	0	0	1	2
Shreveport	0	0	------	0	------	0	0	0	0	0	0	------
Texas:												
Dallas	1	0	------	0	5	0	3	2	0	0	0	------
Galveston	0	0	------	0	------	0	2	0	0	0	0	2
Houston	0	0	------	0	1	0	4	3	1	0	0	------
San Antonio	2	0	------	0	8	0	1	9	0	0	0	2
MOUNTAIN												
Montana:												
Billings	0	0	------	0	8	0	1	0	0	0	0	------
Great Falls	0	0	------	0	15	0	0	0	0	0	0	------
Helena	0	0	------	0	3	0	0	0	0	0	0	------
Missoula	0	0	------	0	2	0	0	0	0	0	0	------
Colorado:												
Denver	1	0	2	0	41	0	1	4	9	0	0	11
Pueblo	0	0	------	0	25	0	0	0	0	0	0	------
Utah:												
Salt Lake City	0	0	------	0	39	0	1	0	4	0	0	1

*Nonresident cases included: Charleston, S. C., 1; New Orleans, 4.

City reports for week ended June 22, 1946—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	29	0	2	1	1	0	1	8
Spokane	0	0	------	0	3	0	0	0	0	0	0	3
Tacoma	0	0	------	0	------	0	0	0	0	0	0	4
California:												
Sacramento	1	0	------	0	13	0	0	0	1	0	0	------
San Francisco	2	0	------	1	25	2	7	0	13	0	0	2
Total	58	5	13	10	3,148	32	213	48	467	1	22	490
Corresponding week, 1945	56	------	29	9	1,817	------	294	------	704	1	14	606
Average, 1941–45	50	------	24	[1] 10	[2] 2,831	------	[1] 266	------	630	1	17	920

[1] 3-year average, 1943–45.
[2] 5-year median, 1941–45.

Dysentery, amebic.—Cases: Buffalo, 11; New York, 2; Chicago, 1; Detroit, 1.
Dysentery, bacillary.—Cases: New York, 3; Detroit, 2; Baltimore, 1; Memphis, 1; San Antonio, 4; San Francisco,1.
Dysentery, unspecified.—Cases: New Haven, 1; San Antonio, 11.
Rocky Mountain spotted fever.—Cases: Frederick, 1.
Tularemia.—Cases: St. Louis, 1; Winston-Salem, 1.
Typhus fever, endemic.—Cases: Tampa, 6; Mobile, 3; New Orleans, 4.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1943, 32,479,800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	15.7	7.8	2.6	0.0	1,751	5.2	41.8	0.0	125	0.0	10.5	240
Middle Atlantic	9.3	0.5	1.4	1.4	336	5.1	28.7	1.9	86	0.5	4.2	41
East North Cnetral	3.1	0.0	1.2	1.8	493	6.8	24.6	1.8	87	0.0	2.5	99
West North Central	20.1	2.0	4.0	0.0	205	4.0	60.3	14.1	70	0.0	4.0	62
South Atlantic	14.9	0.0	3.3	3.3	986	6.6	38.2	10.0	43	0.0	0.0	118
East South Central	5.9	0.0	5.9	5.9	136	0.0	82.6	5.9	18	0.0	5.9	65
West South Central	8.6	0.0	0.0	0.0	89	0.0	45.9	63.1	3	0.0	2.9	17
Mountain	8.3	0.0	16.5	0.0	1,099	0.0	24.8	33.0	107	0.0	0.0	99
Pacific	9.8	0.0	0.0	3.3	229	6.5	29.4	3.3	49	0.0	3.3	55
Total	9.3	0.8	2.1	1.6	507	5.2	34.3	7.7	75	0.2	3.5	79

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 1, 1946.—During the week ended June 1, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		44		132	618	35	37	25	107	998
Diphtheria	3	4		23	7	3	1	2	2	45
Dysentery, unspecified					2					2
German measles				44	38		1	11	9	103
Influenza		2					5		4	11
Measles		31	3	494	1,240	68	29	318	11	2,194
Meningitis, meningococcus			1		3					4
Mumps			1	39	350	84	34	37	183	728
Poliomyelitis	4	1			1					6
Scarlet fever		7	2	101	74	12	2	13	5	216
Tuberculosis (all forms)		12	40	67	62	20	18		47	266
Typhoid and paratyphoid fever			1	19	1				7	28
Undulant fever				1	4				1	6
Venereal diseases:										
Gonorrhea	1	17	5	118	146	42	49	56		434
Syphilis		10	3	90	98	22	13	6		242
Whooping cough		3		22	84	1		6	1	117

CUBA

Poliomyelitis.—During the month of May 1946, 65 cases of poliomyelitis with 1 death were reported in Cuba, distributed by provinces as follows: Habana, 30 cases, 1 death (city of Habana, 14 cases, 1 death); Matanzas, 20 cases; Santa Clara, 10 cases; Pinar del Rio, 4 cases; Camaguey, 1 case.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Smallpox

Mexico.—For the month of May 1946, 78 cases of smallpox were reported in Mexico. States reporting the highest incidence are: Jalisco, 42 cases; Nayarit, 20 cases.

Typhus Fever

Belgian Congo.—For the week ended June 8, 1946, 103 cases of typhus fever were reported in Belgian Congo.

Ecuador.—For the month of May 1946, 65 cases of typhus fever, with 3 deaths, were reported in Ecuador. Provinces reporting the highest incidence are: Azuay, 19 cases, 1 death; Tungurahua, 13 cases; Canar, 10 cases.

Mexico.—For the month of May 1946, 124 cases of typhus fever were reported in Mexico. States reporting the highest incidence are: Federal District, 34 cases; Mexico State, 32 cases.

Morocco (French).—For the period June 1–10, 1946, 199 cases of typhus fever were reported in French Morocco, including cases reported by regions as follows: Agadir and frontier districts, 23; Casablanca, 29; Fez, 52; Marrakech, 30; Meknes, 36; Oujda, 1; Rabat, 28.

Peru.—For the month of April 1946, 102 cases of typhus fever were reported in Peru. Departments reporting the highest incidence are: Cuzco, 31; Puno, 21; Cajamarca, 15; Junin, 9; Huancavelica, 8.

Yellow Fever

Colombia — Magdalena Department — Municipality of Plato. — On March 31, 1946, 1 death from yellow fever was reported in the Municipality of Plato, Magdalena Department, Colombia.

Nigeria—Oyo Province—Ogbomosho.—On May 17, 1946, 25 cases of yellow fever, including 24 cases of suspected yellow fever, with 1 death, were reported in Ogbomosho, Oyo Province, Nigeria.

Sierra Leone—Pujehan.—One case of suspected yellow fever with the date of onset about June 11, 1946, resulting in death on June 20, 1946, was reported in Pujehan, Sierra Leone, about three and one-half miles from Freetown. All precautions have been taken.

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