

Publicity about possible chromosome damage caused by LSD and about damage to offspring when LSD is taken in pregnancy has reached such a pitch that it seems to be impossible to discuss LSD at all without somebody bringing this up. Therefore this Bulletin will try to organize the evidence to date and discuss its implications.

Two questions are raised: a) Does LSD cause chromosome breakage, and if it does, what does that signify? and b) Does LSD cause defective babies? These questions may or may not have something to do with one another. I will discuss them separately and then take up the question of their relatedness.

I have tried to read all the published scientific studies on these questions. The following are all the ones I have found: (1) Cohen *et al.*, *Science* 3/17/67; (2) Irwin and Egozcue, *Science* 7/21/67; (3) Alexander *et al.*, *Science* 7/28/67; (4) Auerbach and Rugowski, *Science* 9/15/67; (5) Geber, *Science* 10/13/67; (6) Loughman *et al.*, *Science* 10/27/67; (7) Cohen *et al.*, *New England Journal of Medicine* 11/16/67; and (8) Zellweger *et al.*, *Lancet* 11/18/67. From here on I'll refer to these articles by number.

Chromosomes

(1), (2) and (7) are studies which associate LSD with chromosome breaks in white blood cells. In (1) the breaks were found *in vitro*, *i.e.*, after LSD was added to the extracted cell cultures; in (2) and (7) they were found *in vivo* (in the cells of people who had taken LSD). Everyone has some broken chromosomes in his white blood cells, but the LSD users had significantly more breaks than the non-users. There was no consistent correlation with dose or frequency. In some cases a significant number of breaks was found several months after the last dose of LSD.

(6), however, in a study of LSD users in San Francisco, found no significant difference in chromosome breaks between users and controls. Dr. Israelstam, one of the authors of (6), writes that he knows of 5 studies reporting chromosome damage from LSD, and 4 studies reporting none. So this is still an open question. It is not known why different experimenters are getting opposite results.

What is the significance of chromosome breakage in white blood cells, if it does occur? There is no evidence that it causes any disease. Chromosome breakage is found in some diseases, including leukemia, certain kinds of anemia, measles, chicken pox and the common cold. The does not seem to be any reason to believe, however, that the chromosome damage

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causes these diseases rather than the other way round.

Babies

(3), (4) and (5) describe damage to animal embryos (rats, mice and hamsters, respectively) when LSD was injected early in pregnancy. Dosage per body weight was similar to human dose. No deformities were found when the LSD was given late in pregnancy. In (3), the rats were allowed to give birth. LSD rats had abortions and stillbirths, some normal babies, and some abnormally small babies; the controls all had normal litters. In (4) and (5) animals were killed before giving birth, and the fetuses examined. Those of the LSD-treated animals showed obvious deformities. In (5) deformities were also caused by BOL (a non-psychedelic derivative of LSD) and mescaline.

(8) reports a baby with a malformed leg born to a young woman who had taken LSD four times while pregnant. Although no definite conclusions can be drawn from a single case, the idea that LSD caused the malformation is considered plausible because the parents were healthy, the mother took no other drugs while pregnant (I find this hard to believe, but that's what it says), and one of the LSD doses was on the 45th day of pregnancy, during the critical period for limb formation.

There have been many instances of women taking LSD while pregnant and having normal babies. I do not know any details about these cases.

Although one cannot always generalize from animals to people, and although the evidence for LSD-induced birth defects in humans is very limited, still I think we can all agree that a woman should avoid LSD during the first 3 months of pregnancy, and also during those times when she is not yet sure whether she is pregnant.

Does LSD affect heredity?

First we must distinguish what are called congenital defects from hereditary defects. "Congenital" refers to something that happens to the embryo while it is in the womb. "Hereditary" refers to the characteristics that the parents pass on to the child through the germ cells (sperm or ovum) - characteristics that are potentially present in these cells before conception. The damage to the animal fetuses and the baby girl mentioned above is congenital, not hereditary damage, because it results from what happened when the mothers were already pregnant.

There is no evidence of hereditary damage from LSD. Therefore it is not quite accurate when some people speak of the findings in these studies as "genetic damage," since in biology "genetic" means pertaining to heredity. The chromosomes of the white blood cells are not passed on to one's offspring. Only the chromosomes of the sperm and ovum are passed on to offspring at conception. This means that unless LSD damages chromosomes in the sperm or egg cells, it could not cause hereditary damage, i.e., it could not hurt a future baby that hasn't been conceived yet.

We do not know whether LSD affects the chromosomes of the germ cells, since it is not practical to test these cells directly. It should not be difficult, however, to find out whether LSD causes hereditary defects. One could give LSD to, say, rats - male, female or both - before they mate, and then see what kind of babies they later produce. So far, nobody has tried this. We may assume that if LSD ever causes hereditary defects in people, it must be extremely rare. Any large percentage of defective babies among LSD users could hardly go unnoticed.

As to what causes the congenital defects, nobody knows. It could

be chromosomal breakage in the embryo when the mother takes LSD, or it could be something else. (Dr. Israelstam has suggested that the vasoconstrictive effect of LSD might be what has caused these deformities in fetuses.) There is some limited evidence for LSD taken in pregnancy leading to chromosome breaks in the baby - in (7) three out of four children of three mothers who took LSD while pregnant had a high rate of chromosome breaks. But these children were normal. The baby with the malformed leg in (8) had some chromosome breaks, but the sample of her cells taken was so small that it is difficult to know whether the breaks were abnormally many. No study of chromosomes was made in the animals.

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I mailed the above material to 13 medical doctors, including one author from each of the above-listed articles, asking them to check for any scientific errors or important omissions. Six have replied to date: all found the material essentially accurate; three had added comments.

Dr. Egozcue points out that in the following conditions - ataxia telangiectaria, Blooms syndrome, Fanconi's anemia, radiation viruses in lab animals - "where there is increase in chromosome breaks there is an increased incidence of cancer and leukemia." (He said nothing about measles or colds.) However we still have no reports of cancer or leukemia in any LSD user. Egozcue's colleague, Dr. Irwin, has written me of the LSD-chromosome findings that "there is no evidence of any disease state arising from it."

Drs. Egozcue and Auerbach both pointed out that damage to the reproductive cells might go unnoticed if it took the form of increased miscarriages. Dr. Auerbach also pointed out that hereditary damage might not show up in the first generation of children if recessive genes were affected. None of the doctors disputed the fact that there is no present evidence of any hereditary damage at all from LSD.

Dr. Humphry Osmond commented on the difficulty in generalizing from animals to humans in studies of this sort, mentioning a report that aspirin will kill a rat fetus, whereas thalidomide does it no harm.

In a paper called "LSD and Society," R.E.L. Masters and Jean Houston (authors of The Varieties of Psychedelic Experience who have done extensive research with LSD and peyote) devote several pages to the chromosome controversy. They write:

We have discussed all the evidence cited with cancer specialists, geneticists, and other specialists, and have found few who believe on the basis of available evidence that LSD or any other psychedelic drug has been shown to present unacceptable physical hazards. In private conversations, and even semi-publicly - as at a meeting of physicians addressed by one of the authors - the LSD-chromosome "peril" has tended to be treated as something of an "in" joke. On the other hand, there are a few much-quoted physicians who have become anti-psychedelic drug crusader-celebrities, and who believe, or profess to believe, that the evidence against psychedelics is unassailable and all of the anxieties fully warranted. A bare handful of professionals has publicly challenged these extremists.

One reason I quote this passage is that my own experience in discussing

this subject with physicians has been very much like that of Dr. Masters.

My personal intentions, since some people have asked, are to continue using LSD at my usual rate - 100 mcg. every 4 months. (I am opposed to frequent use on other grounds.) If pregnant I would not use it - that is a precaution I would have considered appropriate even before the recent studies.

As mentioned at the start of this Bulletin, the chromosome controversy has tended to monopolize attention in discussions of psychedelics and divert needed consideration of other issues. I don't intend to let this happen to the Bulletin - so this is as much discussion of the issue as I plan to do for the coming year. Undoubtedly there will be more developments. For instance, there will probably be a few more defective babies born to LSD users, since statistically, any sufficiently large group will produce a few defective babies. When this happens it will get lots of publicity and be blamed on LSD. Since I won't have space to discuss each new development as it arises, I will defer the whole question for a year, and may take it up again in Bulletin 20, 21 or 22.

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This is an obituary for Jim Beatty, who was killed last summer in a motorcycle accident in New York City. I just learned of it. He was, I think, about 37. Jim was my LSD "connection." He was honest, generous and dedicated. He never sold any purple pills, pink capsules, or stuff with fancy tradenames. He just sold plain old LSD. A penny a microgram. It was always the real thing, pure, and accurately measured. He made little or no profit.

A medical technician by trade, Jim dropped out to spread the Word. He was evangelistic, not "cool," and so he was busted. He spent 7½ months in federal prison in Danbury.

Jim belonged to a time when we thought the world could be enlightened just by flooding it with acid. I know now that it is not so simple, but I admire the spirit of those who believed in that vision and tried to fulfill it. There were few who tried more consistently or devotedly than Jim Beatty.

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Literature available from PIC: Session Games People Play - A Manual for the Use of LSD. by Lisa Bieberman. \$1. 40% off on 10 or more copies (no COD orders please).

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