crease or diminish it at will. As for the organ, it seems to be passing beyond the capacities of one performer. He now has two or three keyboards to manage, a row of pedals, and a huge battery of stops. It is no wonder that so many organists take to drink and die in the gutter. Mr. Redfield makes the plausible suggestion that it would be far better to have two performers to each organ, and suggests that they might be helped furthermore by various mechanical devices. As things stand, they frequently face such technical difficulties that their only recourse is to pull out all the stops and drown their blunders in a torrent of sound. If they had help it might be possible to increase the number of keys from twelve in an octave to thirty-five, and so get rid of the tempered scale. That would not only improve the organ itself; it would also improve choir singing, and so advance the Kingdom of God.

Mr. Redfield suggests many new instruments—a flute playing down to C in the bass clef, a couple of new fiddles between the violin and the 'cello, a contrabass clarinet in E♭, a new and lower trombone with a large helicon bell, a set of timpani capable of sounding the whole chromatic scale, and soprano and bass snare-drums. He believes that there are excellent possibilities in the xylophone, the orchestral bells and the marimba. All of them, he says, are much superior to "the dulcimer at the time Cristofori converted it into a piano by giving it a keyboard." The orchestral bells, in particular, attract him. He proposes that their solid bars be abandoned for pipes of the sort used in clocks and dinner-chimes, that resonator tubes and vibrator disks be provided, that piano hammers and dampers be added, and that a keyboard top the whole. "All the literature of the piano would be immediately available to be played upon it," and the result would be "the most ravishing sounds ever heard from a keyboard." Moreover, the new instrument would probably cost a great deal less than a piano —and it would always be in tune.

I give a few samples from an extraordinarily thoughtful and interesting book. Mr. Redfield has more to say than any of the usual musical theorists. His ideas are supported by a great body of exact knowledge, and he writes with great clarity and charm.

Cousin Jocko

THE BRAIN FROM APE TO MAN, by Frederick Tilney. $25. 2 vols. 10¼ x 7¾; 1120 pp. New York: *Paul B. Hoeber.*

THIS huge work, in the main, is not for the layman. Dr. Tilney, who is professor of neurology at Columbia, goes into details which only those trained in anatomy and histology can be expected to comprehend. The evidences of his industry and patience are really almost appalling. He has not only made a careful study of the gross anatomy of all the brains in the long series from that of the lemur to that of man; he has also made microscopic examinations of them at thirteen levels, and, with the aid of his colleague, Dr. Henry Alsop Riley, attempted reconstructions of the gray matter by the Bourne method. The result is a monograph of the first importance. It is crowded with facts that have been hitherto unknown or inaccessible, and they are presented in a very orderly and convenient manner, with accurate measurements and plenty of diagrams and photographs. The two volumes are beautifully printed. Their great size and weight makes handling them somewhat laborious, but every student of comparative anatomy will find them indispensible, and no doubt they will hold their authority for a long while.

Dr. Tilney's conclusion, in brief, is overwhelmingly in favor of the doctrine that man and the apes are closely related, and that they have evolved from common ancestors. The proofs that he adduces from their brain structure are such that it is impossible to imagine anyone questioning them. If they are not conclusive, then no evidence can ever be conclusive. The brains of the lowly lemurs and marmosets, though

they are very primitive, yet show the rudiments of all the peculiarities that mark the brain of man. They differ radically from the brains of the other mammals, even the highest; they manifestly belong to a special order. That man has actually descended from these lower primates is, of course, not argued; they all show evolutionary differentiations which separate them from him quite clearly. They have gone on their ways, as he has gone on his. But that there was a time in the remote past when the fathers who begat them were identical with the fathers who begat man must seem almost self-evident to anyone who examines the evidence. To dispute it is to argue for improbabilities so vast that merely to state them is to show their absurdity.

How man broke away from his anthropoid relatives and ran so far ahead of them is a question that Dr. Tilney discusses at some length, though without coming to any definite conclusion. Obviously, the main change was in the brain, and especially in the frontal lobe thereof. In even the highest apes the frontal lobe is still rudimentary, but in *Pithecantropus erectus* it already shows "exuberant growth" and "its features correspond with those of *Homo sapiens* in nearly all details." It is smaller than in man, but that "is its only essential inferiority." *Pithecantropus* lived and had his being on the intellectual level of a Tennessee pastor, but nevertheless he could genuinely think, just as a Tennessee pastor can think. No ape so far discovered is to be compared to him. He was not a gorilla, but a man. Nevertheless, he was still very close, in more than one way, to the gorilla. His mind worked, but it was still cloudy, and no doubt three-fourths of his daily acts were little more than simple reflexes. He could think, but he thought only as a rare luxury. Was he one of the direct ancestors of man? The answer is not clear. But if he was, then it is easy to believe that it took half a million years to lift his progeny to the level of man today.

The higher apes of the present, according to Dr. Tilney, may linger upon a level inferior to that of man, not because they are more primitive, but because, in one important respect, they are less primitive. That is to say, they have four hands instead of the two that man has. When their four hands developed they were lifted clearly above the other mammals, but they were also seriously handicapped, first because their new powers committed them "to an almost exclusively arboreal life," and secondly because they were led into "a field of psychological indecision which had a profound effect by causing a quandary as to whether the hand should be used as a foot or the foot as a hand." Here, I confess, I follow the learned professor only with difficulty. His reasoning, indeed, seems to me to be as shaky as his English. He is even less convincing when he tries to account for the loss of manual function in the human foot—for he apparently accepts it as axiomatic, though it is actually somewhat doubtful, that the ancestors of man also lived in the trees. Here he takes refuge in dark talk about the endocrine glands, those handy catch-basins for all physiological puzzles. But it seems to me to be scarcely more likely that "enlargements in the pituitary body . . . may have so altered metabolism as to produce that degree of macrosomia which is no longer adapted to tree-dwelling" than it is that primitive man got rid of his apposable big toe by submitting to treatment by an osteopath.

The change, when it came, took place in the brain, as Dr. Tilney's own evidence shows, and especially in the frontal lobe. It was the development of the frontal lobe that enabled man to widen the gap between sensation and reaction, and so made him the most neokinetic of animals. It was thus that he learned how to think, and differentiated himself from the poor beasts who merely jump. But what set the frontal lobe to bulging? Here one guess is as good as another. Mine is that the loss of hair on the forehead may have had

something to do with it. It cooled off the frontal lobe, and maybe let in some ultra-violet rays. The first thinker, like the last, was probably somewhat mangey. The first bald-head man was the first philosopher. I do not offer this hypothesis as fact, and specifically refuse to urge that it be taught in the schools. But it seems to me to be quite as plausible as any other that I have ever heard.

The Family as a Corporation

LIVING WITH OUR CHILDREN, by Lillian M. Gilbreth. $2.50. 7⅜ x 4⅞; 309 pp. New York: *W. W. Norton & Company.*

No one, I take it, will ever question Dr. Gilbreth's right to discourse upon the training of children, for she has brought eleven into the world, and ten of them are alive, healthy, prosperous and out of jail. Nor is she a mere empiricist, for to her tremendous maternal experience she has added the training of an industrial engineer, and three learned degrees follow her name. Yet more, she is a competent woman of affairs, and since the death of her husband, Frank Bunker Gilbreth, four years ago, she has carried on his business as a consultant in scientific management. Finally, she is the author of half a dozen books and a multitude of professional monographs, and, as the present volume shows, knows how to write clearly and persuasively. The acquisition of all this experience and all these forms of skill she has crowded into fifty years. Certainly you will go a long way before you find a more remarkable woman!

Her contention here is that family life ought to be better organized than it commonly is—that a great many of its usual jars and unpleasantnesses might be avoided if they were tackled as industrial waste, say, is tackled. She indulges herself in no fatuous plea for "scientific" mating. The way of a maid with a man, she assumes, is fundamentally irrational, and trying to rationalize it would get us nowhere. She and her late husband, she confesses, were but slightly acquainted when they married, and neither was the ideal mate for the other. But what is thus ordained of God may be made bearable by the application of a realistic common sense. The conflict of taste, tradition and interest may be analyzed as any other conflict of forces may be analyzed, and plans may be devised to get 'round most of the difficulties it presents. The point is that good will is not enough: there must also be intelligent thought.

Dr. Gilbreth's description of the way in which her large family was brought up is tremendously interesting. The children were early introduced to the notion that they had duties and responsibilities as members of the family firm. They were not converted into little drudges, but simply encouraged to take on communal activities consonant with their emerging tastes and abilities. The older ones, as in all families of any size, instructed and policed the youngsters, and the parents stood above them as critics, teachers and courts of appeal. A family council was organized, with regular meetings, and all of the children were members of it, even the youngest. All were free to propose projects and to discuss those proposed by others. Its deliberations were carried on with the utmost solemnity, and even, it appears, with the forms of parliamentary law! And the most elaborate records were kept of all its proceedings, and of all other family enterprises, whether collective or individual.

Thus summarized, the scheme may sound harsh and uncomfortable, but Dr. Gilbreth's narrative actually gives a far different impression of it. It was intelligent, it was practicable, and it seems to have made for contentment and happiness. I commend the record to all readers blessed with viable issue, and no less to those whose families consist only of the survivors of oxidized love affairs. The book is full of novel ideas, and behind it there is an ingenious and original mind.