The palpatory method for determining the extent of relaxation of the pelvic symphysis is not very precise, although in experienced hands, the movement in the pelvic symphysis is readily felt. Fluoroscopic examination helps in determining a positive response, but it is doubtful if this method is as reliable as palpation. The X-ray has given additional data and, as judged from a recent report,[12] it is quite reliable in detecting changes in the pelvis of mice.

Summary. In oophorectomized guinea pigs primed with estrogens, desoxycorticosterone acetate can substitute for progesterone in bringing about relaxation of the pubic symphysis. Only a few animals showed a degree of relaxation comparable to that obtained in advanced pregnancy. Milk secretion was obtained in many of these guinea pigs.

12 Hall, K., and Newton, W. H., *J. Physiol.*, 1946, **104**, 346.

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Roentgenographic Studies of the Normal Human Gallbladder.

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This preliminary study was made to ascertain how the diminution in size of the gallbladder shadow is accomplished following a fatty meal.

Method. Twelve healthy individuals were chosen, 6 males and 6 females, aged 20 to 27 years. Following a fat-free evening meal, 3 g of Priodax (beta-(4-hydroxy-3,5-diiodophenyl)-alpha-phenyl-propionic acid) was given orally.[1] Only fruit juice, tea, black coffee, and water were allowed until 14 hours later. Then after a cleansing enema the first film (A) was taken. Following this a meal consisting of 8 ounces of cream with yolks of 2 eggs was given. A second film (B) was taken one hour later, and a third (C) 4 hours after the first. All exposures were made in the upright position, in neutral respiratory phase, after the gallbladder had been located by fluoroscopic examination.

Roentgenographic Data. In all instances the gallbladder was clearly visualized on the first films (A). The size of the gallbladder varied in different individuals. The shadow appeared to have a greater density at its most dependent, fundic, portion, decreasing in density toward the uppermost, collic, portion, which was usually indistinctly outlined (Fig. 1-4).

On the second films (B), taken one hour after ingestion of the fatty meal, the gallbladder shadow was invariably present, although in 2 instances it was faintly outlined. In 3 instances the decrease in size of the shadow was negligible. In the remaining 9 instances, the shadow was decreased in size about 10 to 50%. The density of the shadow was usually increased and was more uniform, with clearer outline of the neck (Fig. 1-4).

On the third films (C) taken 4 hours after the fatty meal and 3 hours after the second exposure, the shadow of the gallbladder was present in all instances except one. In 6 instances the shadows decreased in size about 50 to 75% as compared to the first films. In 5 instances there was only slight diminution in size of the shadow, and there was a distinct difference in the density between the fundic and collic portions of the gallbladder, the fundic portion being more dense and more sharply outlined (Fig. 3 and 4). In 3 of these the shadows closely resembled in size and shape those on the first films (Fig. 2 and 4).

Interpretation. The ingestion of the Priodax, according to present knowledge, is followed by the appearance of the radio-

1 Einsel, I. H., and Einsel, T. H., *Am. J. Digest. Dis.*, 1943, **10**, 206.

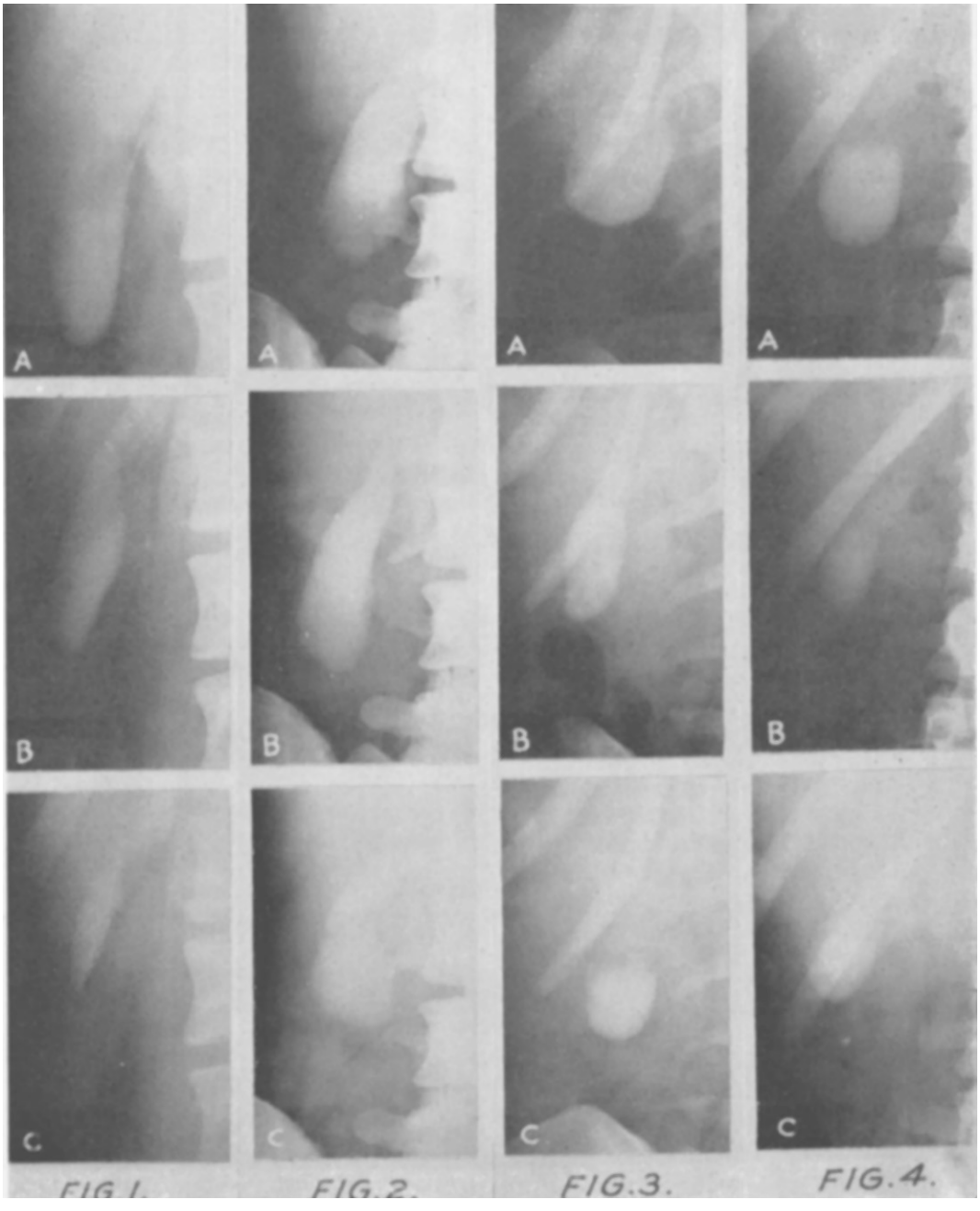

Fig. 1 to 4.
Films A were taken 14 hours after the ingestion of Priodax, B one hour later following the fatty meal, and C 4 hours after the first films. Case 1, 5, 7, and 9, respectively.

opaque substance in the bile. Information is not available as to how long the Priodax is present in the bile coming from the liver and in what concentrations. Experimental data on other substances, methylene blue,[2,3] tetraiodophenolphthalein, eosin, erythrosin and rose bengal,[4] provide information as to the rate of their excretion in the bile and their

accumulation in the gallbladder. According to experiments with one of these substances (methylene blue), the gallbladder can resorb half the volume of its fluid content per hour.[5,6] There is probably a close similarity between the behavior of these substances and that of Priodax. During the period in which radio-opaque substance is present in the bile, some of it reaches the gallbladder. There the opaque substance is resorbed more slowly than the bile and so it eventually attains sufficient concentration to cast a shadow on an X-ray film.

All films in this series were taken in the upright position. The shadow cast by the gallbladder content therefore more closely approximates the anatomic outline of the viscus than that in films taken in the horizontal position.

At the time the first films were taken, neither the hepatic, the common bile, nor the cystic ducts were visualized. Only the gallbladder contained the opaque substance in high enough concentration to cast a shadow. The same situation prevailed at the time of the second and also of the third films. Since in each instance the shadow on the second film changed its contour slightly and its size decreased 10 to 50% of the original and became more dense, it is safe to conclude that practically none of the opaque substance left the gallbladder between the time of the first and second exposures. The presence of sufficient opaque substance to visualize the viscus 4 hours after ingestion of the fatty meal would also support the contention that no loss by evacuation of the gallbladder content through the cystic duct necessarily occurred between the time of the second and third exposures.

Evacuation through the cystic duct of any considerable quantity of the gallbladder content would reduce the amount of radio-opaque substance remaining. Such a decrease of the opaque substance in the gallbladder, however, would cause the shadow not only to become smaller, but also more faint. Selective resorption, on the other hand, removes the solvent leaving the opaque substance in increased concentration, hence the increased density of the shadow on the second films.

A stimulation such as the fatty meal, which causes an increase of the flow of bile from the liver and into the duodenum, may temporarily decrease or increase the flow of bile into the gallbladder. In either event, the gallbladder continues to resorb half the volume of its content per hour. The change in contour, the reduction in size and the increase in density of the shadow as observed on the second films may, therefore, be explained by further concentration of the opaque substance while little or no new bile enters the gallbladder. The changes on the third films, 3 hours after the second, may be explained by the variations in the amount of new bile entering the gallbladder and diluting the opaque substance present. From the data so far obtained it may therefore be concluded that the diminution in size of the gallbladder shadow following the fatty meal is not necessarily caused, as currently believed, by evacuation of the gallbladder content but may be accomplished by selective resorption.

Summary. Cholecystographic studies on 12 healthy individuals were made in the upright position. The data so far obtained indicate that the diminution in size of the gallbladder shadow following the fatty meal may be accomplished not necessarily by evacuation but rather by selective resorption of the gallbladder content.

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[2] Halpert, B., and Hanke, M. T., *Am. J. Physiol.*, 1929, **88**, 351.

[3] Mills, D. R., and Halpert, B., *Am. J. Physiol.*, 1933, **103**, 265.

[4] Halpert, B., and Hanke, M. T., *Am. J. Physiol.*, 1932, **100**, 433.

[5] Halpert, B., Thompson, W. R., and Marting, F. L., *Am. J. Physiol.*, 1935, **111**, 31.

[6] Halpert, B., O'Connor, P. A., and Thompson, W. R., *Am. J. Physiol.*, 1935, **112**, 383.