XXXII. THE CURATIVE ACTION OF AUTOLYSED YEAST AGAINST AVIAN POLYNEURITIS.

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In a previous communication [Cooper, 1913] a method was described for the preparation from voluntary muscle of a substance, small amounts of which readily cured polyneuritis in pigeons. The method employed however was not only expensive, but the yield of active substance was very small, so that an attempt has since been made to discover a less costly process of preparing a non-toxic strongly curative substance suitable for use in the treatment of human beri-beri.

Yeast has for some time been known to be very effective in curing polyneuritis in birds, its curative action having been first observed by Schaumann [1910], and Cooper and Funk [1911] subsequently showed that the yeast still retained its curative properties after hydrolysis with 20 % sulphuric acid for 24 hours.

As yeast contains a powerful proteolytic ferment and is easily obtainable in the East, it was thought that possibly a suitable curative solution could be prepared from it by autolysis.

325 gms. of pressed brewers' yeast was accordingly placed in a flask in the hot room (35° C.) for 36 hours, and the yeast was rapidly converted into a brown fluid. This was filtered, and the residual cell-debris washed with a little water. The total volume of the combined filtrate was 270 cc.; 3 cc. of the liquid readily cured pigeons (300 gms.) affected with polyneuritis in 3 to 12 hours, and even 1—2 cc. improved the condition of the birds. As from 3 to 6 gms. of pressed yeast was necessary to bring about complete recovery, it is seen that the solution resulting from autolysis was at least as strongly curative as the original yeast.

A solution of similar potency could be obtained by the addition of 95 per cent. alcohol to the autolysed yeast, but, apart from the fact that the alcohol coagulated the cell-debris and so facilitated filtering, this method had no advantage over the one described above.

By treating the alcohol-free filtrate with basic lead acetate, a copious precipitate was obtained, and the active substance passed almost entirely into the filtrate. In this way much of the colouring matter could be removed, and the highly curative filtrate, although not superior to the original solution therapeutically, can be so readily obtained in large amount that it should be suitable raw material for fractionation with a view to the isolation of the anti-neuritic substance.

Five kilos. of pressed yeast were next autolysed as before for 36 hours, and the filtered solution measured 4500 cc. Three cc. of this readily cured pigeons affected with polyneuritis in a few hours, and the solution stored in the cold room retained its curative power for at least 8 weeks. Birds were then given orally large volumes of this active solution to ascertain if it exerted a toxic action, and the following results were obtained:—

Bird	Weight	Dose	Effect
Pigeon	300 gms.	30 cc. (15 cc. twice in 8 hrs.)	} Still healthy 1 week afterwards.
"	300 "	30 " " "	
Chicken	1800 "	100 cc. (50 cc. " "	
"	500 "	36 cc. (18 cc. " "	

The results show that as much as 10 times the curing dose (3 cc.) given to pigeons had no injurious effect, and even 100 cc. given to the chickens did no harm.

Some experiments were also carried out to ascertain whether a strongly curative solution could be as easily prepared when the yeast was first air-dried at 20° C. To 75 gms. of the dry preparation, which had been stored for six weeks in a dry tin, 250 cc. of water was added, and the yeast allowed to autolyse at 35° C. for 48 hours. The mixture was then filtered, and the insoluble matter washed with water, the combined filtrates measuring 250 cc. Three cc. of the solution again rapidly cured neuritic pigeons. As 1–2 gms. of the dried yeast were required to effect complete recovery, it is seen that the solution was quite as strongly curative as the material from which it was derived. 0·5 cc. of the solution injected subcutaneously rapidly cured a pigeon, and 1–2 cc. had no toxic action.

Air-dried yeast retained its marked anti-neuritic properties even after storage in a dry tin for two years, and after four months' storage still readily autolysed when mixed with water and kept at 35° C.

By autolysing yeast it is thus possible to prepare a highly active solution which being non-toxic and inexpensive should be suitable for the treatment of human beri-beri on a large scale. Owing to the stability of the anti-neuritic substance and proteolytic ferment contained in yeast, as shown above, the yeast can be air-dried, stored under dry conditions, and autolysed as required.

SUMMARY.

1. By the autolysis of brewers' yeast a solution can be obtained which possesses as marked curative properties towards avian polyneuritis as the original yeast.

2. The solution retains its curative power for at least eight weeks and when given orally to birds in doses 10 times as great as the minimum curing dose has no toxic action.

3. Air-dried yeast retains its curative power after storage for two years in a dry tin, and still autolyses after storage for four months.

CONCLUSION.

The autolysis of brewers' yeast should afford a simple inexpensive method of preparing a non-toxic solution suitable for the oral treatment of human beri-beri.

REFERENCES.

- Cooper (1913), *Biochem. J.* 7, 268.
— and Funk (1911), *Lancet*, 2, 1266.
Schaumann (1910), *Arch. Schiffs. Tropenhygiene*, 14, 8.