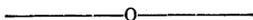


ard, which the writer has collected several times here [and the past summer in Collin County], and which has its type-locality at Clifton, in Bosque County, Texas⁷; next a specimen of the parasitic Copepod, *Argulus lepidostei* Kellicott, from the common gar, *Lepisosteus osseus* (L.), in the Trinity at Dallas; the fourth is *Estheria belfragei* Packard, 1871 (type locality, Clifton, Texas⁷). In respect of *Argulus lepidostei* which Kellicott described from a gar-pike in the Niagara River, in 1877, Boll made the observation, in common with Kellicott's later observation that the species frequently leaves its host and swims about, or, as Riley puts it, "uses the gar-fish simply as a beast of burden."



A SIMPLIFIED METHOD FOR THE PREPARATION OF BUTYRIC ACID*

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As an elective experiment in the class in organic preparations it was decided to make pure butyric acid from *n*-butyl acetate. To accomplish this the plan followed was (1) the hydrolysis of the ester to obtain *n*-butyl alcohol (2) the oxidation of the alcohol to the acid, and (3) the separation of the acid from the mixture.

Procedure: Ninety grams of *n*-butyl acetate was refluxed for twenty-four hours with fifteen grams of sodium hydroxide dissolved in 150 cc of water. A solution of twenty grams of sodium hydroxide in 60 cc of water was then added to the mixture. It was well shaken and allowed to stand in order to permit the two layers to separate. The flask was then cooled with ice and water in order to decrease the solubility of the alcohol in the water layer. The alcohol was then removed by means of a separatory funnel and subjected to fractional distillation, the fraction distilling between 111° and 119° C. being collected separately.

⁷Geiser, S. W. "On the Type Localities of Certain Texas Phyllopoda", *Field & Laboratory* 1:47-50, 1933.

*The writers are greatly indebted to Dr. M. L. Whitsitt for helpful suggestions.

The yield of butyl alcohol was about 56 per cent of the theoretical.

This distillate was added to 190 grams of potassium dichromate and 255 grams of concentrated sulfuric acid contained in a liter flask. The reaction mixture was refluxed for two hours in order to bring about the oxidation of the alcohol to butyric acid. The refluxing was discontinued at this time and 25 grams of acid-washed diatomaceous earth was added to prevent frothing. The flask was connected through a Hempel fractionating column to a condenser and the mixture was then subjected to rapid distillation on the sand bath. The first 50 cc of distillate, which came over around 100° C. was discarded since it consisted mainly of water. The distillation was continued until the temperature reached 165° C.; however, a large portion came over at 105° C. In order to effect its separation the acid was converted into calcium butyrate as follows: the entire portion collected from 105° to 165° C. was slowly added with constant stirring to a suspension of 110 grams of precipitated calcium carbonate in 50 cc of water contained in a liter beaker. The mixture was allowed to stand for a short while and was then slowly evaporated to dryness on the water bath. The dried mixture was treated with 110 grams of concentrated sulphuric acid, sp. gr. 1.841, in a liter distilling flask to which was connected a reflux condenser. By this means the excess calcium carbonate was removed and butyric acid was liberated from the calcium butyrate. The mixture was distilled from the sand bath, the distillate being collected up to 165° C. This liquid, which consisted of butyric acid and a small amount of water, was distilled from twice its volume of concentrated sulphuric acid to remove the last traces of water. The distillation was stopped at 165° C. The yield was 39 grams of the acid with a boiling point of 163.5° C. By using *n*-butyl acetate, which because of its extensive use as a paint solvent, is easily obtained, the writers believe they have found a useful and simple method for preparing butyric acid in small quantities.