

They show a creeping growth up the side of the container and on gelatin wort grow as a shiny colony. The bacterium sheaths stain blue with Lugol's solution.

*Bacterium xylinum* was found in several specimens; they grow as a thick tough leathery film. The sheath stains blue with Lugol's solution. This organism may cause the vinegar to lose its sour taste if cultured too long. Its growth is inhibited by shutting off the supply of oxygen.

*Bacterium acetigenum* is very motile and will not liquefy wort gelatin and is found in nearly all mother of vinegar.

*Bacterium oxydans* is very motile and will not liquefy wort gelatin.

*Bacterium industrius* was found in one specimen. It is very motile.

*Bacterium vermiforme* is characterized by having a swollen sheath.

*Bacterium termo* is very short and motile. The cultures have a damp, musty odor and grow as grayish wrinkled films.

*Saccharobacillus Pasteurianus* was found in hop cultures only, so it is unlikely that it is a normal constituent of the vinegar bee. It is an alcohol producer and if grown too long will give a very bitter taste to the culture media.

Several specimens showed organisms resembling *Bacillus viscosus* and *Bacillus Acidi lactici*, but unfortunately were not isolated.

*Mycoderma cerevisiae* grows as a dull gray wrinkled colony. The cells contain 1 to 3 highly refractive granules. This organism did not produce fermentation and it was strictly aerobic.

One of the molds found in practically every specimen was *Penicillium glaucum*. This organism will aid acetic fermentation in sugar solutions.

It is probable that some of the other yeasts concerned in vinegar production and found in vinegars could be isolated from vinegar bees. The chief ones are: Primary—*Saccharomyces pastorianus* (*Mycoderma pastorianus*), *S. ellipsoidus*, and *S. anamalus*. Secondary—*Saccharomyces marxianus*, *S. exiguus*, *S. Ludwigii* and *S. membranaefaciens*. Organisms which cause the same results as the vinegar bee were cultivated but unfortunately not isolated, by boiling corn meal for two hours under 15 pounds steam pressure, mixing the cooled corn meal with molasses and exposing to the air, when in several days copious growths were obtained; also by exposing solutions of bakers' yeast in molasses to the air.

Vinegar bees are a mixture of organisms probably coming from the air and may contain harmful as well as the desired vinegar-forming organisms. Great care should be exercised in obtaining cultures and in their preparation to exclude all pathogenic organisms. It was found that all the pathogenic organisms which will grow in vinegar solutions are anaerobic.

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## INORGANIC INCOMPATIBILITIES OF ORGANIC DRUGS.\*

BY CARL BRAUBACH.

The occurrence of a crystalline sediment in a proprietary preparation, in connection with the bursting of numerous bottles, led the proprietor to ask for advice as to its nature and the best method of eliminating it, as he thought this was the cause of the bursting.

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The tanks in which the preparation was aged were found to be lined with a hard, brown crystalline coating. A similar material was deposited in bottles of the preparation, which had been standing for some time. This coating gave 76 percent of ash and consisted principally of magnesium phosphate, some calcium, a small amount of sulphates and traces of iron and organic matter. The medicine was prepared from vegetable drugs, principally roots, and the only chemical added was sodium bicarbonate. The menstruum was 20% alcohol.

A chemical analysis of the ash of the several drugs used in the preparation of the liquid brought out the fact that the ash of yellow dock contained a large amount of magnesium, evidently present in the drug as the soluble magnesium oxalate. The ash of other drugs used contained soluble phosphates. These reacted in the finished alkaline mixture and on standing produced a dense, crystalline precipitate, consisting mainly of magnesium phosphate. (The precipitate was exhibited.)

The only way to obviate this objectionable feature of the preparation seems to be to change the formula by substituting some other drug for the yellow dock, which contains the magnesium.

The matter is brought forward in order to direct attention to the possibility of the occurrence of an inorganic incompatibility between organic drugs. This form of incompatibility may be easily overlooked and prove the cause of much annoyance. The remedial of the origin of trouble caused by the formation of the crystalline sediment could, of course, not be connected with the bursting of the bottles.

Although the fact that sodium bicarbonate solutions have a tendency to decompose with the liberation of free carbon dioxide is commented on in the National Dispensary, by Hager, by the French Codex, and other pharmaceutical authorities, it seems to be lost sight of, sometimes, by pharmacists in devising formulas. The manufacturer of this proprietary medicine had disregarded the advice of a pharmacist to substitute an equivalent quantity of the monocarbonate for the bicarbonate in his preparation. While I felt confident that the decomposition of the bicarbonate was the cause of the trouble, I made sure of this by a process of elimination. The gas contents of some of the bottles, showing pressure, were examined first and the gas was identified as carbon dioxide.

The fact that the explosion did not occur for some months after the preparation was bottled and there was no liberation of gas in the freshly prepared medication proved that the gas had not been liberated by a direct chemical reaction between the ingredients. The contents of the exploded bottles contained numerous bacteria and also spores, despite the presence of 20 percent alcohol; this indicated a possibility that they were in some way the source of the gas. It was possible, however, to demonstrate bacteriologically that the presence of the bacteria and spores was not responsible for the bursting and, also, that the bicarbonate alone was to blame for the explosions.

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