SOME CONSTITUENTS OF HOPS.

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From the American Journal of Pharmacy, December, 1877.

It is pretty generally supposed that lupulin contains all the active principles of the hop. Some doubt in regard to this having been recently expressed, the writer has endeavoured to settle the question, with what success may be judged from the following experiments. The best of hops were selected, those as nearly ripe as could be found during picking; from these the bracts were carefully removed; the ends next to the achenes, to which part of the bracts most of the lupulin adheres, were trimmed off with scissors; the remainder of each bract was then passed between the thumb and finger to remove the remaining particles of lupulin, a magnifying glass being used from time to time to see that the work was thoroughly accomplished. This process is a difficult and tedious one, the lupulin adhering to the bracts with considerable tenacity. The bracts were then allowed to dry, without the aid of artificial heat, and were found to shrink about three-fourths in weight; after much perseverance one troy ounce of the dried bracts was obtained. Some difficulty was next experienced in powdering them; rubbing them with sand in a mortar was first tried, and found to be exceedingly slow work; grinding in a drug mill was next attempted, but found to be simply impossible; the method finally resorted to, and found to work nicely, was to cut the bracts in pieces with

shears. This may readily be done by grasping the hand full of them and passing the shears repeatedly through many of them at once, sifting out the fine particles from time to time. The powder thus obtained was exhausted with stronger alcohol, and a tincture obtained possessing a bitter taste and some odour, neither of which would, however, hardly remind one of hops. The alcohol was distilled off from the tincture, and an extract obtained weighing seventy grains. To the distillate was added some water, the alcohol distilled off at a gentle heat, and the heat then raised. The distilled water was observed to have a slight foreign odour, but could not be recognized as the odour of hops; it had no effect on litmus paper, and produced no change in colour with a solution of permanganate of potassa, evidently containing not more than the merest trace of volatile organic matter.

Of the extract obtained twenty grains was reserved for further experiment, the remaining fifty grains being tried in the following manner:—One half of it was given to a healthy person; no effect being experienced, in one hour the remainder was given; no effect whatever was noticed upon either pulse, temperature or respiration. The portion reserved was dried by means of the water-bath until it ceased to lose weight, after which the weight was found to be 1.013 gram; of this, .225 gram, or about 22 per cent., was insoluble in water; the portion soluble in water was found to give the reactions characteristic of tannin, and also to contain a small amount of bitter extractive. The amount of the extract reserved was, however, too small to admit of many experiments.

I then endeavoured to determine the nature of the tannin contained in hops, 700 grains of which were exhausted with boiling water, the decoction evaporated nearly to extractive consistence, and treated with alcohol to remove the gummy matter. The alcohol was evaporated and the residue dissolved in water; the percentage of tannin was then estimated by means of a standardized solution of gelatine containing alum; only about 6 per cent. of tannin could be found. The remainder of the solution was then precipitated with neutral acetate and with subacetate of lead; the two precipitates had much the same appearance, and both were soluble in acetic acid. They were each thoroughly washed, then suspended in water, and decomposed with sulphuretted hydrogen. The filtrate from each was found to contain the tannin, which gave a blackish-green colour with ferric chloride, and precipitated a solution of gelatine containing alum. The two solutions were mixed and the tannin precipitated with an excess of common salt, from which an unsuccessful attempt was made to entirely free it.

For the final experiment six ounces of hops were taken and exhausted with boiling water; the decoction was concentrated, treated with alcohol, filtered, the alcohol evaporated off, the residue dissolved in water, and the percentage of tannin estimated as before; only a little more than five-tenths per cent. being found. The solution, being acid to test paper, was carefully neutralized with ammonia and precipitated with neutral acetate of lead, a bright yellow precipitate being obtained; the filtrate gave no reaction with subacetate of lead and contained no tannin. The precipitate was thoroughly washed, suspended in water, decomposed with sulphuretted hydrogen, the precipitate washed until the washings gave no colour with ferric chloride, and the filtrate evaporated to a small bulk, and shaken with ether in hopes that the tannin might be dissolved; the ether, however, failed to take up any of the tannin, and portions of the solution were therefore treated with the following re-agents:—Tarter emetic, which produced a nearly

white precipitate on standing; ferrous sulphate, no effect; sulphuric and hydrochloric acid at once produced precipitates; protochloride of tin, no effect; sulphate of copper, no effect; solution of potassa gave a dark reddish-brown colour, but no precipitate; gelatin gave a precipitate on standing. The green-black precipitate with ferric chloride certainly indicates that this is not gallotannic acid, which in other respects it resembles, and the reaction with the mineral acids would seem to show with equal certainty that the tannin is not moritannic acid, which it is stated by Wagner to resemble.

NOTE ON A METHOD OF VALUATION OF THE RELATIVE IMPURITIES OF DRINKING WATERS.

By G. W. WIGNER, F.C.S.

I HAVE been engaged for some time past in the preparation of a numerical scale so as to enable an approximate estimate to be made of the amount of impurity represented by *every figure* in a water analysis. I have been experimenting on this scale as applied to some 200 analyses of water which have been made for and published in the *Sanitary Record*, and I hope to bring the subject before the Society of Public Analysts at their next meeting. The point which I am seeking to bring out is, that certain definite allowances should be made for the nitrogen in every other form of combination as well as in that of albuminoid ammonia, and that the salt, loss on ignition, oxygen absorbed and microscopical results should also each be credited with a certain value.