

the pharmacy of these remedies does not differ from the method employed in teaching the official drugs and preparations. Our method of instructing students in dispensing may, however, have some points of interest for you.

The prescriptions containing the drugs and preparations to be studied are first classified into groups according to "New and Non-official Remedies," such as anesthetics, barbitol compounds, silver preparations, etc., after which the students are assigned this chapter or group for study prior to the lecture and recitation. Whenever possible original packages of the material under discussion are shown the students during the lecture. An attempt is made to select preparations that have been previously studied in chemistry and pharmacology.

The prescriptions are placed in a baloptican projector and flashed on a silver screen in the front of the room in full view of the entire class. They are then read and discussed by the professor in charge during the first few lecture periods, or until the students become accustomed to the procedure, after which the students are called upon to read and discuss them.

In conclusion, the general procedure followed in the discussion of individual products may be summed up briefly by the use of the following example:

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| Name of Article..... | Luminal Sodium. |
| The Manufacturer..... | |
| Composition or Formula.... | The monosodium salt of phenylethylbarbituric acid. (All other information of this character is taken up in the department of chemistry.) |
| Description and | |
| Physical Properties..... | A white hygroscopic powder; very soluble in water; soluble in alcohol; practically insoluble in ether and chloroform. An aqueous solution of luminal-sodium has an alkaline reaction to litmus. |
| Actions and Uses..... | The same as those of phenolbarbital; sedative or hypnotic. (All other information of this character is taken up in the department of pharmacology.) |
| Dosage..... | $\frac{1}{2}$ to 5 grains. |
| Forms on the Market..... | Powder in $\frac{1}{2}$ - and 1-oz. bottles. Ampuls (powder) 2 and 5 grains. Capsules—5 grains. Tablets— $\frac{1}{4}$, $\frac{1}{2}$ and $1\frac{1}{2}$ grains. |
| Incompatibilities..... | Is neutralized with free acid or acid solutions and the normal salt is precipitated in aqueous or low alcoholic solutions. (For example, Compound Elixir of Pepsin and Rennin, N. F., which contains free lactic acid.) |

RESEARCH IN PHARMACEUTICAL EDUCATION.*

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The interest which pharmacists have in educational matters was evidenced many years ago by the establishment of this Section. Through the subsequent organization of the American Association of Colleges of Pharmacy and through the activities of the Committee on Educational Methods established by the National

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Conference on Pharmaceutical Research further impetus has been given toward stimulating an interest in educational matters and building up a literature in this field.

Over the years a great deal of attention has been given to improvements in curricula and teaching methods and to various matters of educational technique such as types of examination, honors courses, etc. The interest in educational methods on the part of pharmacy teachers is very commendable, but there is one phase of pharmaceutical education whose paramount importance must never be lost sight of, *i. e.*, the correctness of the material that we teach. If the facts we are teaching are incorrect, or the explanations we offer are erroneous or highly improbable, of what avail are all the theories of educational procedure?

Lack of sufficient training on the part of the teacher of course leads directly to poor teaching. On one occasion in a court trial an instructor in a naval academy was questioned regarding his preparation in his field. In his reply he admitted that he was not well versed in the subject he was teaching, but stated that he endeavored to be a fair referee between the student and the book. In our field I recall the statement of a man who had had no training whatever in pharmacy, but who claimed that he could teach pharmacy, stating that if he got half a dozen pages ahead of the students they would never catch up with him.

However, in fields of wide scope, such as we have in the pharmaceutical sciences, in which changes are constantly occurring due to changes in medical practice and to the discovery of new facts in the underlying sciences, it is a real problem, even for the well-trained teacher, to keep his courses strictly up-to-date.

When teaching loads are heavy, and much time is required for routine clerical and committee work, and when a teacher is assigned to teach several branches in the field it becomes necessary to depend more and more on standard textbooks. In any case the mis-statements and discrepancies found in text and reference books are a hindrance to good teaching. In some instances such errors may be due to insufficient study of the literature on the part of the author. Frequently the error is due to discrepancies in the literature itself, and to differences of opinion which cannot be resolved without further research. Every pharmacy teacher should be constantly on the lookout for commonly accepted material which from his own special experience appears questionable. If he goes a step further and carries out literature studies and research work to determine which facts are correct, he is taking a great step toward improvement of his teaching. If he publishes his findings, thus making them generally available to his colleagues, he is making a definite contribution to pharmaceutical education.

By way of illustration, I will cite an example from my own experience. A few years ago I observed that contradictory statements appeared in various reference books regarding U. S. P. Benzoinated Lard. The supposed effect of benzoin in retarding the development of rancidity in lard was variously ascribed to the benzoic acid, cinnamic acid, volatile oil, resin and odorous constituents. This lack of agreement led me to make a search of the journal literature on this point; this showed many conflicting opinions but very little careful experimental work. With the assistance of co-workers, I have carried out several experimental studies to clear up this point. Our first work (1) showed that benzoic acid and cinnamic acids are not effective in retarding the rancidity of lard. Incidentally, a study of

other reputed preservatives was made (2); these were found ineffective with the exception of hydroquinone, which in concentration of 0.5% reduced the rate of development of rancidity about 50%. Although the value of benzoin as a preservative seemed well established in the older literature, some question arose on this point. We then found by experimentation (3) that plain lard deteriorated several times as rapidly as benzoinated lard. It was also found that benzoin was responsible for the change in color from white to gray which was observed in Ointment of Potassium Iodide, N. F. V. Finally the individual constituents of Siam benzoin were tested one by one and it was found that coniferyl benzoate is the constituent responsible for the preservative effect of Siam benzoin in lard (4). We thus have gained a satisfactory understanding of this preparation, which is official in a dozen of the leading pharmacopœias of the world.

The unsatisfactory statements in reference books regarding Solution of Arsenous and Mercuric Iodide, U. S. P. X led to studies which I will mention briefly in passing. Textbooks gave the impression that this solution contained a double compound of AsI_3 and HgI_2 , while in reality it is a solution of arsenous acid, hydriodic acid and hydrogen mercuric iodide. A leading textbook stated that there was no chemical reaction in the making of this preparation, while as a matter of fact there are extensive chemical changes involving practically complete hydrolysis of the arsenous iodide and the formation of a complex ion. A leading reference book stated that the aqueous solution of arsenous iodide is neutral, whereas we found the p_H to be 1.2. By searching far enough back in the literature, we found that the acidity of the solution was known over a hundred years ago and this had repeatedly been verified by research workers since that time but these published researches were overlooked or disregarded by the "swivel-chair scientists" who made the pharmacopœias and other books.

It is logical that research for teaching should be done in our colleges. Some of the preparations which require study may derisively be called "antiquated solutions" or "stagecoach remedies" but as long as they remain official and must be included in our courses it is not to our credit to allow our knowledge and teaching to be inadequate and incorrect. No one teacher has the ability to find all such discrepancies or the time to study all that he might see, but if more such studies are made by more teachers it will be possible to eliminate a great deal of misinformation from our textbooks and place the teaching of pharmacy on a higher level.

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