ENZYMES of the PHARMACOPOEIA S

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Fairchild, in a detailed account of the history and properties of pepsin credits Schwamm, 1836, with being the first to ascribe a ferment nature to the active principle of the gastric juice. He called this ferment pepsin, devised a method for purifying it, and studied its properties.

In 1839 Wasmann, a pupil of Schwann, following the methods of Schwann, prepared a very potent product from the stomach of the pig. This was considered to be a combination of pepsin with hydrochloric acid.

In 1859, Beale, who appears to be one of the first to suggest the use of pepsin in medicine, published a method for preparing pepsin by scraping the mucous membrane of the stomach, and drying the product on glass at low temperature.

Von Wittich, in 1869, suggested the use of glycerin in extracting pepsin, a method since used extensively for both scientific research and commercial preparation, and one which has been applied to the extraction of other enzymes.

Scheffer, in 1872, devised a method for the commercial preparation of pepsin by precipitating an acid infusion of the stomach with common salt.

In 1873, Ebstein and Grutzner showed that pepsin does not exist as such in the stomach, but is rapidly formed from its progenitor, pepsinogen, by the gastric acid. This seems to have been known by Schwann and Wasmann, who, however placed no emphasis upon it.

Many other investigators have studied pepsin and many methods for its preparation have been suggested.

The methods used in commercial practice as Fairchild points out, are those which have been devised by scientific research and experiment, and have been demonstrated to prepare the purest and most efficient product.

Though extracts of the pancrea's were made and studied, almost as early as those of the stomach, by Eberle, Bernard, Bouchardat and Sandras, and others; and though these extracts were known to liquify proteins, convert starch into sugar, and emulsify fats, little progress was made in its utilization as medicinal agent. It was, accordingly much later in making its appearance in the pharmacopoeia's than was pepsin. This was probably due somewhat to the fact that its importance was not appreciated, and largely to the use of wrong methods in preparing the extract.[1] "Pancreatin" seems to have been first prepared by methods identical with that of pepsin, particularly by the "Salt process", though the pancreatic ferments are soluble in salt solutions and can not be precipitated, by even concentrated solutions of sodium chloride. The products thus prepared were used chiefly for the digestion of fats, and were practically worthless.

Until recently it was necessary that all pancreatic ferments should be administered by way of the stomach, hence they were subject to digestion by the stomach and were thus rendered

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1. Am.Journ.Ph., 74,p.53.

comparatively of little use. The appearance of insulin,[2] a pancreatic preparation which can be administered hypodermically, therefore, promises to revolutionize pancreatic therapy.

At about the same time that pancreatin made its appearance in the pharmacopoeia's rennin and diastase also appeared, though both had been known for a long time and had been used in the industries. Rennin was first official in the U.S.P. in 1880, and diastase in the French Codex in 1885.

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2. Journ.A.Ph.A., Vol.13 p.9

PEPSIN IN THE PHARMACOPOEIA'S

French

The first pharmacopoeia to recognize pepsin was the French Codex of 1866. It there appeared under the name of pepsin medicinale. This was pepsin prepared by the original method of Schwann as elaborated by Wasmann, the purified pepsin being mixed with starch.

Pepsin under the name Pepsinum is official in all the later editions of the French Pharmacopoeia.

British

In 1867 pepsin, prepared by the method originally suggested by Beale, appeared in the British pharmacopoeia under the title of Pepsin.

Pepsin is also official in the following editions. In that of 1885 as Pepsin, 1898 and all later editions as Pepsinum and also as Glycerium Pepsini

British Pharmaceutical Codex

In the B.P.C. of 1907 Pepsin was official as follows -

1. Pepsinum
2. Elixir Pepsini
3. " " et Bismuthi
4. " " " " Compositum
5. " " " " cum Ferro.
6. " " " " " Podophyllino
7. " " " " " Strychnina

8. Elixir Pepsini et Bismuthi cum Strychninae cum Ferro.

9. Elixir Pepsini et quininae

10. " " " " cum Ferro

11.Mistura Bismuthi Composita cum Pepsini

12. " Pepsini Composita

13. " " cum Byno

14.Glycerinum Pepsini

15. " " Fortius

16.Pastillus Pepsinae

17.Sal Pepsinae

18.Vinum Pepsini

19.Extractum Malti cum Pepsino

Pepsin in the B.P.C. of 1911 is official as follows -

1.Pepsinum

2.Elixir Pepsini

3. " " et Bismuthi

4. " " " " Compositum

5. " " " " cum Ferro

6. " " " " " Podophyllino

7. " " " " " Strychinina

8. " Pepsini et Bismuthi et Strychninae cum Ferro

9. " Pepsini et Quininae

10. " " " " cum Ferro

11. Essentia Pepsini

12. Elixir Pepticum

13. " Peptolacticum

14. Glycerinum Pepsini Fortius

15.Liquor Pepticus

16.Mistura Pepsini Composita

17. " " cum Extracto Malti

18.Pastillus Pepsini

19.Pulvis Pepsini Aromaticus

20. " " Compositus

21.Sal Pepsini

22.Tablettae Pepsini

23.Vinum Pepsini

Pepsin in the B.P.C. of 1923 is official as follows -

1.Pepsinum

2.Elixir Pepsini

3. " " et Bismuthi

4. " " " " Compositum

5. " " " " cum Ferro

6. " " " " " Podophyllino

7. " " " " " Strychnina

8.Elixir Pepsini et Bismuthi et Strychninae cum Ferro

9. " " " Quininae

10. " " " " cum Ferro

11. " Pepticum

12. " Peptolacticum

13. Essentia Pepsini

14. Glycerinum Pepsini Forticus

15. Liquor Pepticus

16. Mistura Pepsini Composita

17. " " cum Extracto Malti

18. Pastillus Pepsini

19. Pulvis Pepsini Aromaticus

20.Pulvis Pepsini Compositus

21.Sal Pepsini

22.Tablettae Pepsini

23.Vinum Pepsini

Standards of strength B.P.C. same as B.P.

German

The first mention of any preparation of pepsin in the German Pharmacopoeia is in the edition of 1872 where"Wine of Pepsin" prepared from the stomach of the ox is used.

In the edition of 1882 pepsin is official as Pepsin for the first time.

In the editions of 1884, 1890, 1900 and 1910 pepsin is official as Pepsinum and as Vinum Pepsini

Standards of Strength	
1872	None
1882	"
1884 to 1910	1 to 10 gm.of hard boiled egg albumen.

The United States

The first preparation of pepsin appearing in the United States Pharmacopoeia is Pepsinum Saccharatum which became official in 1880. The Liquor Pepsinal, prepared from Pepsinum Saccharatum appeared at the same time.

In the editions of 1890 Pepsinum and Pepsinum Saccharatum are official.

In the editions of 1900 and 1910 only Pepsinum is official.

Standards of Strength

1880 1 part: 50 egg albumen

1890 Pepsin 1 : 3000

Pepsin Saccharated 1: 300

1900 Same as 1890

1910 " " 1890

National Formulary

In the first edition of the National Formulary 1888, pepsin appears as Pepsinum, also in the following:

1. Pepsinum Aromaticum
2. " Saccharatum
3. Elixir Pepsini
4. " Pepsini, Bismuthi,et Strychninae
5. Elixir Pepsini et Bismuthi
6. Elixir Pepsini et Ferri
7. " Pepsini Aromaticus
8. Glyceritum Pepsini
9. Vinum Pepsini
10. Pulvis Pepsini Compositus

In the edition of 1895, pepsin appears as,

1. Elixir Pepsini et Bismuthi
2. " " " Ferri
3. " Pepsini, Bismuthi et Strychninae
4. Pulvis Pepsini Compositus
5. Elixir of Pepsini
6. Glyceritum Pepsini
7. Liquor Pepsini

8. Liquor Pepsini Aromaticus

9. Vinum Pepsini

In the edition of 1906, pepsin appears official as,

1. Elixir Pepsini et Bismuthi
2. " " et Ferri
3. Liquor Pepsini
4. Pepsini Aromaticum
5. Elixir Bismuthi et Strychninae
6. Elixir Digestivum Compositum
7. Pulvis Pepsini Compositus
8. Elixir Pepsini
9. Essentia Pepsini
10. Glyceritum Pepsini
11. Liquor Pepsini
12. Vinum Pepsini
13. Pepsinum Saccharatum

In the fourth edition, 1910 the following preparations of pepsin are included, -

1. Liquor Pepsini Antisepticus
2. " " Aromaticus
3. Elixir Pepsini
4. Elixir Pepsini, Bismuthi et Strychninae
5. " " et Bismuthi
6. Elixir Pepsini et Ferri
7. " " " Rennini Compositum
8. Glyceritum Pepsini
9. Pepsinum Saccharatum

10. Liquor Pepsini

11. Vinum Pepsini

Standards of Strength

1880 Pepsin 1:500

PANCREATIN of the PHARMACOPOEIA'S

French

Pancreatin was first official in the edition of 1885 as "Pancreatine".

It was also official as Pancreatine in the edition of 1920.

U.S.P.

Pancreatin first appeared in the edition of the United States Pharmacopoeia of 1890 as Pancreatinum. Through all editions including the IXth it remained the same.

Standards of Strength

1910 - Not less than 25 times its own weight of starch

1920 - The same as 1910.

N. F.

Pancreatin was official in the first edition of the National Formulary of 1888 as -

1. Pulvis Pancreaticus Compositus.
2. Liquor Pancreaticus
3. Pancreatinum

Second Edition of 1895

1. Pancreaticus Compositus
2. Liquor Pancreaticus

Third Edition of 1906

Pancreatin official as in the second edition.

Fourth Edition of 1916

Pancreatin official only as Liquor Pancreatini

British

Pancreatin first became official in the British Pharmacopoeia of 1898 as "Liquor Pancreatis."

In the edition of 1914 it is also found official only as "Liquor Pancreatis".

Standards of Strength

1898 2 c.c. : 80 c.c. of milk

1914 3 mm. : 88 mm. of milk.

British B.P.Codex

Pancreatin is officlal in the British Pharmaceutical Codex of 1907 as,

1. Pancreatinum
2. Liquor Pancreaticus Compositus
3. " Pancreatini
4. Cremor Morrhuae Pancreatis
5. Emulsis Morrhuae Pancreatia
6. Extractium Malti cum Pancreatino

B.P.C. of 1915

1. Pancreatinum
2. Elixir Pancreatini
3. Glycerinum Pancreatini
4. Liquor Pancreatini
5. Pulvis Pancreaticus Compositus
6. Tablette Pancreatini

B.P.C. of 1923

1. Pancreatinum
2. Elixir Pancreatini
3. Glycerinum Pancreatini
4. Liquor Pancreatini
5. Pulvis Pancreaticus Compositus
6. Tablettae Pancreatini

RENNIN OF THE PHARMACOPOEIA'S

United States

U.S.P.-

The first preparation of Rennin to appear in the United States Pharmacopoeia was in the edition of 1880, where it was official as Liquid Rennet .

Since then it has been included in the National Formulary.

N.F.

Rennin of the National Formulary is official only as "Liquor Seriparus" in the editions of 1888,1895, 1906.

The edition of 1916 contains Rennin as Rennium.

Standardization

1916 - Not less than 25,000 times its own weight of milk.

British

B.P.C. -

The British Pharmaceutical Codex of 1907 contains Rennin official as -

1. Rennet
2. Seriparus
3. Liquor Seriparus

The B.P.C. of 1911

1. Seriparium
2. Liquor Seriparus

B.P.C. of 1923

1. Seriparium
2. Liquor Seriparus

DIASTASE OF THE PHARMACOPOEIA'S

French

Diastase was first official as "Diastase" in the edition of 1885.

In the edition of 1920 as "Diastase" and "Diastase De L'Orge Germe".

British

Diastase was first official in the British Pharmacopoeia of 1907 as "Diastasum". Also in the B.P. of 1914 as "Diastasum".

In the British Pharmacopoeia of 1915 Diastase is official as follows -

1. Diastasum
2. Extractum Malti cum Hypophosphititibus et Oleo Morrhuae.

National Formulary

Diastase is not official in the editions of the National Formulary of 1888, 1895, 1906 or 1916 but is used in the preparation of Pulvis Pepsini Compositus.

United States

U.S.P. -

Diastase in the United States Pharmacopoeia is not official until the ninth edition, where it is official as "Diastasum".

Standards of Strength

It converts not less than 50 times its weight of potatoe starch to sugars.

British

B.P.Codex -

Diastase is official in the British Pharmaceutical Codex as follows -

Edition of 1907 -

1. Diastasum
2. Extractum Malti and preparation made therefrom

Edition of 1911 -

1. Diastasum

Edition of 1923 -

1. Diastasum

French

Diastase is official in the French Pharmacopoeia of 1920 as

1. Diastase De L'Orge Germe

The following Enzyme preparations are on the market:

I. Armour & Co.

1. Elixir of Enzymes
2. Pancreatin U.S.P.
3. Pepsin U.S.P.
4. Rennet
5. Trypsin (Powder)
6. Essence of Pepsin
7. Glycerole of Pepsin
8. Lactated Pepsin
9. " " (Tablets)
10. Elixir Lactated Pepsin
11. Saccharated Pepsin, 1:300
12. Pepsin Tablets
13. Glycerole Pancreatin

II. Fairchild Bros. & Foster

Gastric Gland

1. Pepsin in Scales
2. " " Powder
3. Pepsencia (Essence of Pepsine)
4. Pepsencia Phenolated (Phenolated Essence of Pepsin)
5. Gastron
6. Glycerinum Pepticum
7. Enzymol

Pancreas Gland

1. Extractum Pancreatis
2. Holadin
3. Holadin and Bile Salts
4. Diazyme Essence
5. Diazyme Glycerole
6. Trypsin
7. Trypsalin (surgical Solvent)
8. Lotis Pancreatis (Trypsin surgical solvent)
9. Injecto Trypsin (Hypodermic)
10. Injecto Amylopsini (Hypodermic)
11. Suppositoria Trypsini

'Pepule' Products

1. 'Pepule' Pancreatic
2. 'Pepule' Pancreatic Compound
3. 'Pepule' Pepsin
4. 'Pepule' Pepsin and Bismuth
5. 'Pepule' Pepsin and Pancreatic
6. " Pepsin, Bismuth and Pancreatic
7. " " " " Nux Vomica
8. " Peptonate of Iron
9. " Ox Gall Compound
10. " Pancro-Hepatic

III. Eli Lily & Co.

Essences

1. Essence Pancreatin
2. " Pepsin

Elixirs

1. Elixir Digestive, Aromatic
2. " Lactated Pepsin
3. " " " and Bismuth
4. Elixir Lactated Pepsin, Bismuth and Strychnine
5. " Calisaya, Iron, Strychnine and Pepsin
6. " Lactated Pepsin, with Hypophosphites
7. " Gention and Iron Chloride with Lactated Pepsin
8. " I.Q. and S., with Lactated Pepsin
9. " Digestive Glycerophosphates.

Nulixirs (Non-alcoholic)

1. Nulixir Pepsin
2. Nulixir Lactated Pepsin
3. " Digestive Aromatic
4. " Pancreatin
5. " and Pancreatin

Tablets

1. Peptonizing, Improved.
2. Digestive, No.1
3. Digestive, No.2
4. Digestive, Aromatic
5. " , Heyden-Starrett
6. " Special
7. Nux Vomica and Pepsin,Skiff
8. " " " " , No.2
9. Ox Gall, Pepsin and Pancreatin
10. Pepsin 1:3000
11. Pepsin, Lactated
12. " and Bismuth No.1
13. " " " No.2
14. " , Bismuth, and Charcoal
15. Pepsin, Bismuth, and Hydrastis
16. " " " Strychnine
17. " and Capsicum, Compound
18. " ,Charcoal,Magnesia and Ginger
19. Pepsin, and Pancreatin No.1
20. " " " No.2
21. " " " compound.

Other Preparations

1. Pepsin 1:3000, 1:2000, 1:4000, 1:5000, 1:6000.
2. Pancreatin
3. Amylopsin
4. Rennin
5. Enzymatic Cordial
6. Insulin

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(Proc.A.Ph.A., 58, 393)
Results of six years of experiment

Hercod and Maben 1911
Method of Valuation of Pepsin proposed for International Adoption
Pharm.Ztg. 1911, 768
(Proc.A.Ph.A., 59,511)

Schamelhont and Kottenhoff 1912
Controversy Regarding Pharmacopoeial Assay Process of Pepsin
Chem.and Drugg., July 27,152
(Yr.Bk.A.Ph.A.1, p.466)
Not Creditable that pepsin should vary so as it is bound to under present tests.

Frey, O. 1913
New Method of Valuation of Pepsin
Apoth.Ztg. 28, p.787
(Yr.Bk.A.Ph.A., 2, p.463

Graber,H.T. 1913
Influence Upon the Result of Size and Shape of Bottles Used for Pepsin Assay.

Journ.A.Ph.A. p.1507
(Yr.Bk.A.Ph.A., 2, p.464)
Use of larger taller bottles is recommended.

Bernegau, Glickman 1913
Variation in the Strength of Hydrochloric
Acid used as Distributing Fact or
Journ.A.Ph.A. p.152
(Yr.Bk.a. Ph.A. 2, p.465)
The digestive power of pepsin an egg albumen is lowered by using either a lower or higher percentage of hydrochloric acid than that of 0.3%

---- 1914
Difference between Pepsins from Different Sources.
Pharm.J., 92, 573;
(Apoth.Ztg.,1914, 203.
Yr.Bk.A.Ph.A.3, p.609)
Proportion of hydrochloric acid which causes the greatest activity is not the same for all pepsins.

--- 1914
Destruction of Pepsin by Electric Current
Pharm.J., 92, 713;
(Am.J.Phys., 32,41.
Yr.Bk.A.Ph.A., 3, 609)
Electric Current decreased peptic activity.

Quant, Ernest 1914
Bacteriological Purity of Pepsin
Trans.Brit.Pharm.Conf., 1914, p.333-337
(Yr.Bk.A.Ph.A., 3,p.608)
Samples of pepsin, obtained from English,American and Continental sources unsatisfactory in regard to their bacteriological purity.

Delauney and Bailey 1915
Rapid Assay of Pepsin
Bull.Soc.Pharm;
(Schweiz.Apoth.Ztg.p.297,
Yr.Bk.A.Ph.A., 4, p.391)
In edestin, a proteid obtained from hemp seed, is found an admirable reagent for the rapid assay.

Gruber H.T. 1916
Freshness of Eggs Determined by Pepsin Test.
J.Ind.Eng.Chem.8, p.911
(Yr.Bk.A.Ph.A., 5, p.406)

Vanderkleed and E'we 1916
Measurement of Undissolved Albumin in Pepsin Assay.
J.Am.Pharm.Assoc.,5,p.718.
(Yr.Bk.A.Ph.A., 5, p.405.)
U.S.P. IX Assay results of undissolved pepsin same 1/2 hour or 15 hrs.after settling.

Aldrick,T.B. 1916
Total Nitrogen and Alpha-amino Nitrogen Content of Pepsin.
J.Am.Med.Assoc., 66, p.822.
(Yr.Bk.A.Ph.A., 5, p.405)
The more highly purified or more active pepsin products approach the native proteins in complexity.

Ramsey,C.F. 1916
Retarding Effect of Certain Substances on Pepsin.
J.Am.Pharm.Assoc., 5 p.30.
(Yr.Bk.Ph.A., 5, p.404)
Influence of pepsin combined with various salts upon digestive activity on egg albumen.

Hamburger and Halphen 1916
Effect of Various Salts on Pepsin
Arch.Intern.Med.;
(Pharm.J., 97, p.523, Yr.Bk.A.Ph.A.,5,p.404.)
Pepsin is rendered completely unactive by the addition of salts.

Grimbert, L. 1916
Criticism of the Standardization of French Codex.
J.Pharm.Chim.,13,p.1
(Yr.Bk.A.Ph.A., 7, p.402)
A critique of the so-called diastase assay.

Graber, H.T. 1917
Rennetic Properties of Pepsin
J.Ind.Eng.Chem.,9,p.1125,
(Yr.Bk.A.Ph.A.,6,p.467)
Results of study are that the substance which gives the rennetic property to pepsin is not the same as that of calf rennin.

Stephenson,C 1918
Use of Pepsin in Cheese Making.
J.Dept.Agr.Victoria;(Chem.Abstracts,12,p.1799,
Yr.Bk.A.Ph.A., 7, p.540)
In present shortage of rennet in New Zealand, pepsin has been found a satisfactory substitute.

Ramsay,C.F. 1918
Permanence of Solutions of Pepsin
Bull.Pharm.,32,p.215
(Yr.Bk.A.Ph.A.,7,p.539)
In course of six months there was a deterioration of from 10 to 40 per cent, thehigher the per cent of acid, the greater the loss of activity.

Davis, L.
Merker,H.M..... 1919
Pepsin--Chemical Changes in
J.Am.Chem.Soc.41,p.221;
(Yr.Bk.A.Ph.A., 8, p.349)
The purification of pepsin seems to consist of the elimination of secondary protein. Calcium sulphate unaltered, phosphorus reduced, no change in optical activity.

Warren, L.E. 1919
Examination of Old Preparations of Pepsin
J.A.Ph.A., 8, p.734; (Yr.Bk.A.Ph.A.8, p.549)
Three old samples examined

Age in years	Ash	Activity
39	28.8	1-500
25	3.01	1-2000
10	4.14	1-2500

Gross, O. 1919
Value of Commercial Preparatus of Pepsin
J.Soc.Chem.Ind.,38.p.876 A;(Yr.Bk.A.Ph.A., 8, p.549)
Thirteen samples of wine of pepsin found to be almost devoid of peptic activity. Loss dependent upon age and temperature of storage.

Funck and Möller..... 1920
Quality of Pepsin
Pharm.Zent.(Chem.Abstracts,14,1183.
Yr.Bk.A.Ph.A., 9, p.664)

Pavlowsky's 1920
Origin of Pepsin
Semona Med.(Am.J.Pharm.,92, 758.
Yr.Bk.A.Ph.A.,9, p.664)
Spleen plays part in pepsin formation.

Bachstez, Mr. 1920
New Assay Method of Pepsin
Pharm.Zent.61,479
(Yr.Bk.A.Ph.A.,9,p.663)
Article gives details of assays of pepsin.

Chenisse, L. 1920
External Application of Pepsin
Presse Med., (Chem.and Drug.,79,1283;
Yr.Bk.A.Ph.A., 9, p.663)
Advantages of external application of pepsin.

Northrup, J.H. 1920
Effect of Hydrogen on Concentration in
Assay of Pepsin
J.Gen.Physiol;(J.Soc.Chem.Ind.,39 133a.
Yr.Bk.A.Ph.A., 9 p.662)
Change of electrical conductivity during peptic digestion may measure amount of pepsin present.

Keefer 1920
Pepsin--Adsorption by Charcoal
Am.J.Pharm., 92, 160
(Yr.Bk.A.Ph.A., 9, p.662)
Keefer shows that our conception of therapeutics of pepsin and charcoal are false.

Davis and Merker 1921
Changes During Purification
Pure Products,--
(Am.J.Pharm., 93, p.254.
Yr.Bk.A.Ph.A., 10,p.540)
Starting with 1-2000 commercial pepsin by fractional precipitation and by dialysing, obtained successively purer products until a sample of the proteolytic strength 1-40,000 was eventually obtained.

Vahlteich,H.W. and Glover,C.C. 1921
Quantitative Estimation of and Stability
of Pepsin, in Preparations.
J.Am.Pharm.Assoc., 10,p.595
(Yr.Bk.A.Ph.A.,10,p.539)
U.S.P.IX assay most rapid and reliable neither edestin nor conductivity methods should supplant it, The "storage-egg" modification is good. Pepsin preparations containing Bi, Fe, aromatics or antiseptics should be prepared extemporaneously.

---- 1921
Determination of the Proteolytic Action of
Pepsin by the Use of Edestin.
J.Biol.Chem.,46, p.119;
(Am.J.Pharm.,93, p.565;Yr.Bk.A.Ph.A., 10,p.338)
U.S.P. method for assay of pepsin not satisfactory. A method by using edestin as the protein material recommended.

--- 1878
Pancreatin (Formula of the Paris Pharmaceutical Society)
A.J.Ph.,1878 p.351
(Proc.A.Ph.A., 26,631)

Morcarta,D.C. 1882
Pancreatins--quality of the Commercial Article
New.Rem.,1882 p.133
(Proc.A.Ph.A.,30,460)
Author subjected samples to examination as to peptonizing action and saccharifying properties.

Eberhardt,E.G. 1890
Pancreatin-Functions and Valuation
Amer.Drugg.1890,190
(Proc.A.Ph.A.,38,720)
Knowledge of Pancreatin very fragmentary.

Choay, Eng. 1899
Pancreatin--Superior activity of that from Pig's Pancreas.
Chem.News.1898,47
(Proc.Am.Ph.A., 47, 775)

Delezenne,C. 1907
Influence of Calcium Salts on Action of Pancreatic Ferment
Ph.J.1907,433.
(Proc.A.Ph.A.55,949)

Vanderkleed and Bernegan 1909
Pancreatin Testing
Proc.A.Ph.A., 55, 941

Choay-- 1910
Pancreatic Ferments--Action of Heat
Pharm.Journ.and Pharmacist,1910.
(Proc.A.Ph.A.,58,393)

La Wall, C.H. 1913
Pancreation a Spurious Article
Proc.Penn.Phar.Assn.,1913,p.224
(Yr.Bk.A.Ph.A.,2 p.466.)
Spurious pancreatin powdered wolt is likely to pass undetested.

Long and Fenger 1916
Accidity of Pancreatic Secretion
J.Am.Chem.Soc.,38,p.115.
(Yr.Bk.A.Ph.A.,5,p.404)
The authors confirm their original statements as to the acidity of the fresh pancreatic secretion.

London 1918
Isolation of Pancreatic Enzymes
J.Am.Med.Assoc.;
(Am.J.Pharm.,90,p.28
Yr.Bk.A.Ph.A., 7.p.540)
That securing of toxins and enzymes in concentrated form has been furthered by work of London.

Vanderkleed, Chas.E. 1905
Rennin--Method of Testing.
Proc.Pa.Pharm.Assoc.,1905,192.
(Proc.A.Ph.A., 54,953.)

Merenstein and Stubbs 1912
Action of Rennet on Milk
Pharm.Journ.and Pharmacist,p.233;
(Journ.Soc.Chem.Ind.,p.657.
Yr.Bk.A.Ph.A.,1,p.468)
Investigations show that retardation of the time of coagulation with rennet is not entirely due to Calcium salts.

Zimmerman,A. 1912
Laboratory Studies of Rennin
Journ.Ind. and Eng.Chem.,4,p.508
(Yr.Bk.A.Ph.A., 1,p.468)
Study of Properties of rennin, prepared by different methods.

Bosworth,A.W. 1913
Action of Rennin on Casein
Journ.Amer.Med.Assoc.,1913,p.898
(Yr.Bk.A.Ph.A.2,p.466)
Action now attributed to rennin may be produced by any proteolytic enzyme.

Vanderkleed and E'we 1916
Time required for Coagulation of Milk by Rennin.
J.Am.Pharm.Assoc.,5,p.714
(Yr.Bk.A.Ph.A.,5,p.406)
Time for coagulation of given sample of milk inversely proportionate to amount of rennin employed.

---- 1919
Animal and Vegetable Rennets.
J.A.Ph.A.,8,p.559;
(Yr.Bk.A.Ph.A.,8,p.550)
Sources, methods of preparation,coagulating power of both animal and vegetable rennets.

Urban,A. 1873
Diastase
Ach.Ph.1873,p.252

(Proc.A.Ph.A.22,286)
Distribution of diastase in Malt.

Hunt,Collins.C.Dr. 1874
Diastase
Am.Dr.Circ.1874,p.142
(Proc.A.Ph.A.,23,468)
Calls attention to diastase as valuable medicinal agent

Perret 1874
Diastase Preparation
Ph.Centralhalle,1874,p.340
(Proc.A.Ph.A.,23,p.467)
Perret recommends the preparation of diastase as is given in reference.

Atkinson R.W. 1882
Diastase of Koji--Characters.
Journ.Chem.Soc.,1881,1059.
(Proc.A.Ph.A.,30,455)
Results of investigation of material used to convert starch to sugar by Japs.

Green,J.R. 1895
Action of Light on Diastase
Journ.Trans.1894, 355.
(Proc.A.Ph.A., 43,1084)
Light whether solar or electric exercises destructive effect on diastase, which continues after light is discontinued.

Reychler,A. 1890
Diastase--Artificial Production.
Proc.A.Ph.A.,38,721
Preparation from Wheat.

Wroblewski,A. 1899
Diastase--Preparation
Ph.J.1898, 481 (Proc.A.Ph.A.47,773.)
Proposes process of preparing pure diastase.

Blome,W.H. 1907
Diastase--Examination of samples of Different Origin.
Ph.Rev.,Sept. '06, 260.
(Proc.A.Ph.A.,55,952.)

---- 1912
Instability of Preparations Containing this Ferment Diastase
Pharm.Journ.and Pharm.,Feb.17,p.199 from Journ.de.
Pharm.et.Chim.,5,p.92
(Yr.Bk.A.Ph.A., 1,p.467)
At the best these ferments are not very stable.

Waksman,S.A. 1920
Testing the Amylolytic Action of Diastase
Am.Chem.Soc.42, 293.
(Yr.Bk.A.Ph.A.,9,p.658.)
The Lentner method for measuring should not be used or malt enzymes.

Wittich,W. 1874
Pancreatin and Pepsin
Ph.Centralhalle,1874,p.330
(Proc.A.Ph.A.,23,468)
Found fibrin capable of absorbing pepsin.
Also confirmed by Ebstein and Grützner.

Gross,M. 1889
Digestive Ferments--Independent Activity
D.A.Apoth.Ztg.,1887 and 1888,253 and 267.
(Proc.A.Ph.A.,36,594)
Author gives details of experiments to determine functions and activity of so-called digestive ferments.

Keppler,Dr.F. 1899
Pepsin and Pancreatin--Non-Interference of Boric Acid with Porteolytic Action
Pharm.Cent.1899, 17
(Proc.A.Ph.A., 47,775)

Harley,V. 1900
Pepsin and Pancreatin--Influence of Heat.
Apoth.Ztg.1900,189.
(Proc.A.Ph.A., 48, 856)

Koch,F.C. 1907
The United States Pharmacopoeia Methods for Assaying Pepsin and Pancreatin
Recommends changes in directions.
Proc.A.Ph.A.,55,372.

Sacks,M.D. 1909
Pepsin and Pancreatin:Their Chemistry and Uses.
Proc.A.Ph.A.,57, 1122.

Wahl,R. 1913
Differentiation of Pepsin and Peptose
Pepsin of animal origin, peptose of vegetable origin.
Suedd.Ap.Ztg.,No.102
(Yr.Bk.A.Ph.A., 2 p.463)

Engelhardt and Winters 1913
Assay of Pepsin and Rennet
Proc.Md.Phar.Assn.,1913, 52-54
(Yr.Bk.A.Ph.A. 2, p.465)
Advisable to increase amount of undissolved albumen.

Rubner,M. 1914
Removing Pepsin,Rennin or Trypsin from Solution
Bull.Pharm.,1914, p.440;
(Yr.Bk.A.Ph.A., 3, p.610)
Aluminum hydroxide will remove all the pepsin rennin, trypsin from solution.

Fuld,E. 1914
Rennin and Pepsin--Is their Action Identical?
Compt.Rend.9 Intern.Pharm.Cong.,p.781
(Yr.Bk.A.Ph.A., 3, p.610)
Pepsins differ, as well as Rennins.

- --- 1914
Action of Pepsin and Rennin
J.Am.M.Assoc., 62 855-856;
(Yr.Bk.A.Ph.A., 3, p.609)

Edie, E.S. 1914
Pepsin and Trypsin.--Action on one Another.
Pharm.J.,93, 395
(Yr.Bk.A.Ph.A. 3, p.609)
The inhibition is directly proportional to the amounts of the enzyme present.

Neppi,B. 1915
Valuation of Proteolytic Power of Pepsin and Pancreatin.
Apoth.Ztg.,p.419
(Boll.Chim.farm.Yr.Bk.A.Ph.A.,p.419)

Teplis, M.C.

Toplis, W.G. 1919
Action of Pancreatin in the Presence of Pepsin
Proc.Penna.Ph.A., 42, p.273;
(Yr.Bk.A.Ph.A., 8, p.548)
Pepsin destroys the action of pancreatin when taken into the stomach.

Graber, H.T. 1921
Relation of hydrogen Ion Concentration to Enzyme Activity.
Jr.A.Ph.A.,10,p.437;
(Yr.Bk.A.Ph.A.,10,538)
Results of studies show that the measure of the reaction of hydrolysis by pepsin is not dependent upon acidity but upon the hydrogen ion concentration.

APPROVED

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