

**Quiz questions on embryology, operative dentistry and dental pathology /
by H.B. Tileston.**

Contributors

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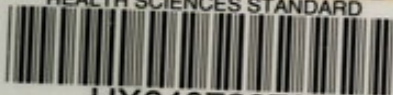
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Quiz questions on em

QUESTIONS

ON EMBRYOLOGY

Operative Dentistry and Dental
Pathology—P. H. B. TILSTON, M.D., D.D.S.
LOUISVILLE COLLEGE OF DENTISTRY



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in the City of New York

School of Dental and Oral Surgery

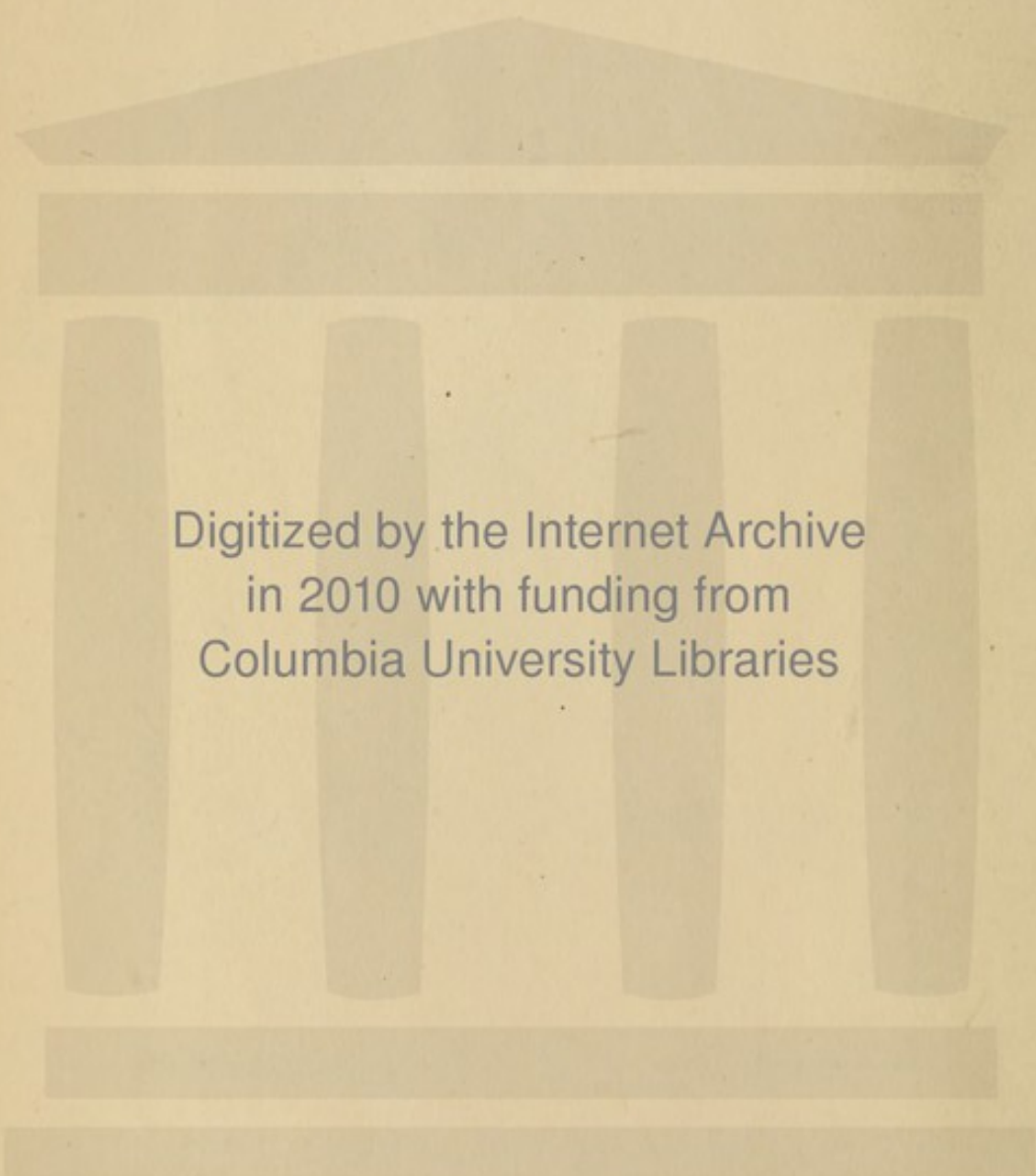


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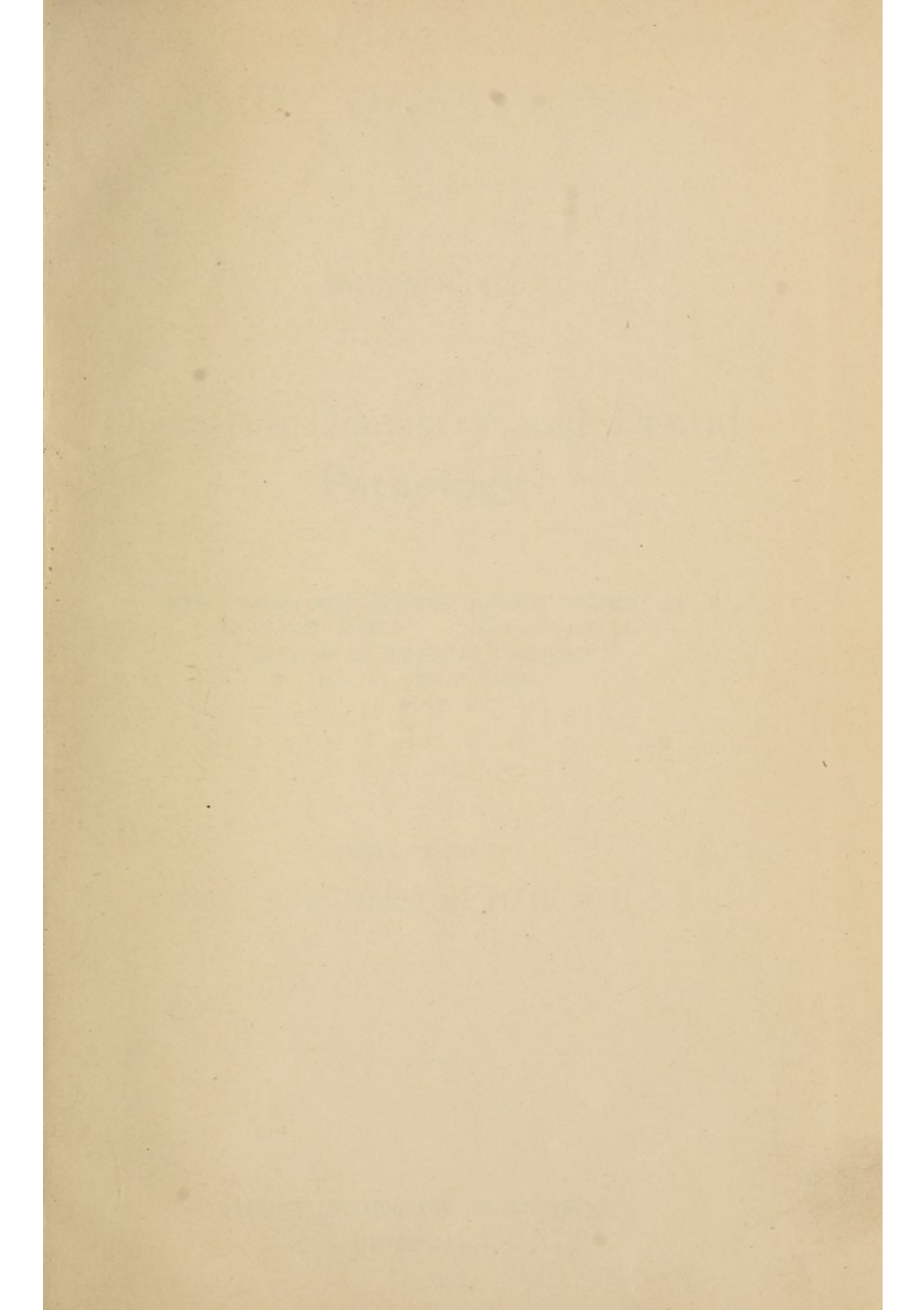
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QUIZ QUESTIONS

ON

EMBRYOLOGY

Operative Dentistry and Dental Pathology

WITH APPENDIX GIVING ANSWERS TO SUCH QUESTIONS AS
ARE MARKED WITH A *. ALSO A DETAILED DE-
SCRIPTION OF METHOD OF CONSTRUCT-
ING THE HOLLOW GOLD
INLAY.

FROM LECTURES BY

PROF. H. B. TILESTON, M. D., D. D. S.]

LOUISVILLE COLLEGE OF DENTISTRY,
LOUISVILLE, KY.

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PREFACE.

The purpose of this volume of questions is to aid the students of The Louisville College of Dentistry in their study of the subjects presented in the lectures by the professor of Embryology, Operative Dentistry and Dental Pathology.

It is in no sense intended to be considered a text-book, nor is it expected that it will take the place of text-books. On the contrary, the object the writer has had in mind is to encourage the extensive use of text-books by the students and it is hoped that these questions will but prove an incentive and a guide to further study of the subjects merely outlined in this volume.

On Embryology the student is recommended to the careful study of the chapters in Vol. 1 of The American System of Dentistry on Dental Embryology and Histology by W. Xavier Sudduth, M. D., D. D. S., and to chapter II in the work on Operative Dentistry by Dr. John Sayre Marshall. This latter treatise is beautifully illustrated and the text is clear and comprehensive.

In the arranging of a lecture course on Operative Dentistry tribute has been levied upon the writings of a number of authors to whom acknowledgment is hereby made. The chapters by Dr. Louis Jack in The American System of Dentistry and in The American Text-Book of Operative Dentistry have

been especially useful to the writer and the student is earnestly recommended to a careful reading and study of Dr. Jack's writings.

In preparing lectures on Dental Caries the writer has of course depended upon the original work of Dr. W. D. Miller of Berlin as published in Vol. 1 of *The American System of Dentistry* and in later papers by Dr. Miller, appearing from time to time in the dental magazines. The papers by Dr. Leon Williams, Dr. G. V. Black and the chapters by Dr. J. S. Marshall in his *Operative Dentistry* have also been drawn upon. More than to any other author, however, the writer is indebted to Dr. G. V. Black, whose scientific attainments and painstaking methods have enabled him to present a system of operative procedures in cavity preparation and filling which is ideal and it has been adopted in this course of lectures on these subjects, as has also his nomenclature. Unfortunately, Dr. Black's work has never been compiled in a volume that could be adopted as a text-book, and for this reason the writer has quoted largely from his papers as published in magazines, in the Appendix to this volume, there being no book to which the student could be referred.

On Dental Pathology the course of lectures follows closely the text of the late Dr. Henry H. Burchard in his work on *Dental Pathology and Therapeutics*, recently revised by Dr. Otto E. Inglis. No answers to questions under this heading are given in the Appendix, as it was thought best to refer the student to Dr. Burchard's book for the thorough and careful study of the entire subject.

A recent work by Dr. Elgin MaWhinney on *Oral Pathology and Therapeutics*, published by The Consolidated Dental Manufacturing Co., is recommended to the student as a reference book.

A blank page is left opposite each page of questions in this quiz book for the convenience of the student, that he may note briefly such answers as are not in the Appendix. Only those questions designated thus * are answered in the Appendix.

In the hope that this compilation of questions with the Appendix may prove helpful, this volume is affectionately dedicated to the student body of The Louisville College of Dentistry.

Louisville, Ky., March 23, 1906.

EMBRYOLOGY.

1. What is embryology?
2. What is histology?
3. What does a cell consist of?
4. From what are all organized beings originally developed?
5. Into what two classes are organized beings divided according to manner of deposit and development of egg?
6. Define each term.
7. How does fecundated egg differ from ordinary cell?
8. What is the spot in a fecundated egg containing the vital principle called?
9. Describe what takes place in the germinal spot.
10. Into what two layers do these cells arrange themselves?
11. How is the mesoblast formed?
12. What is the name of these three layers of cells? What do they constitute?
13. What class of tissues are developed from epiblast?
14. What from mesoblast?
15. What from hypoblast?
16. To what class of tissues do teeth belong?
17. Name divisions of epiblast.
18. Which constitute the Rete Malpighii?
19. What is the function of the infant layer?
20. What takes place as the first indication of the beginning of the development of teeth?
21. How is the dentinal groove formed?
22. Into what tissue does the enamel organ or infant layer dip down?

1. The first part of the report is devoted to a general survey of the situation in the country. It is found that the country is in a state of general depression, and that the people are suffering from want and distress. The cause of this is attributed to the war, which has destroyed the country's resources and has caused a general disruption of the economy.

2. The second part of the report is devoted to a detailed examination of the various branches of the economy. It is found that the agricultural sector is in a state of complete collapse, and that the people are suffering from a severe shortage of food. The manufacturing sector is also in a state of collapse, and the people are suffering from a severe shortage of goods.

3. The third part of the report is devoted to a detailed examination of the social situation. It is found that the people are suffering from a severe shortage of housing, and that the children are suffering from a severe shortage of education. The people are also suffering from a severe shortage of medical care, and many are dying of disease and starvation.

4. The fourth part of the report is devoted to a detailed examination of the political situation. It is found that the government is in a state of complete collapse, and that the people are suffering from a severe shortage of freedom. The people are also suffering from a severe shortage of justice, and many are being persecuted and oppressed.

5. The fifth part of the report is devoted to a detailed examination of the financial situation. It is found that the country is in a state of complete financial collapse, and that the people are suffering from a severe shortage of money. The people are also suffering from a severe shortage of credit, and many are being forced to borrow money at exorbitant rates.

6. The sixth part of the report is devoted to a detailed examination of the military situation. It is found that the country is in a state of complete military collapse, and that the people are suffering from a severe shortage of arms and ammunition. The people are also suffering from a severe shortage of military training, and many are being forced to fight without proper equipment or training.

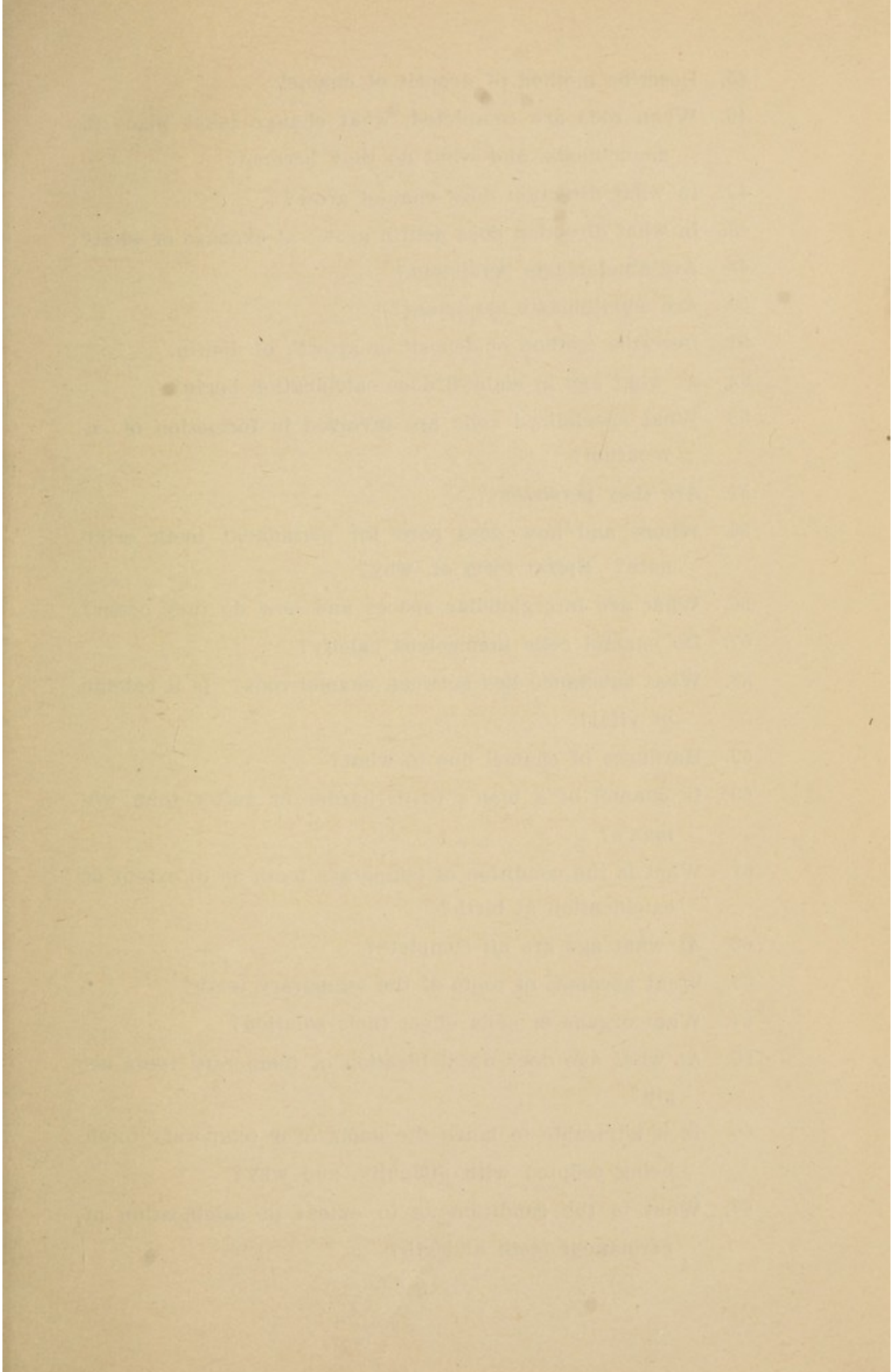
7. The seventh part of the report is devoted to a detailed examination of the cultural situation. It is found that the country is in a state of complete cultural collapse, and that the people are suffering from a severe shortage of culture. The people are also suffering from a severe shortage of education, and many are being forced to live in a state of ignorance and superstition.

8. The eighth part of the report is devoted to a detailed examination of the environmental situation. It is found that the country is in a state of complete environmental collapse, and that the people are suffering from a severe shortage of natural resources. The people are also suffering from a severe shortage of clean water, and many are being forced to live in a state of poverty and degradation.

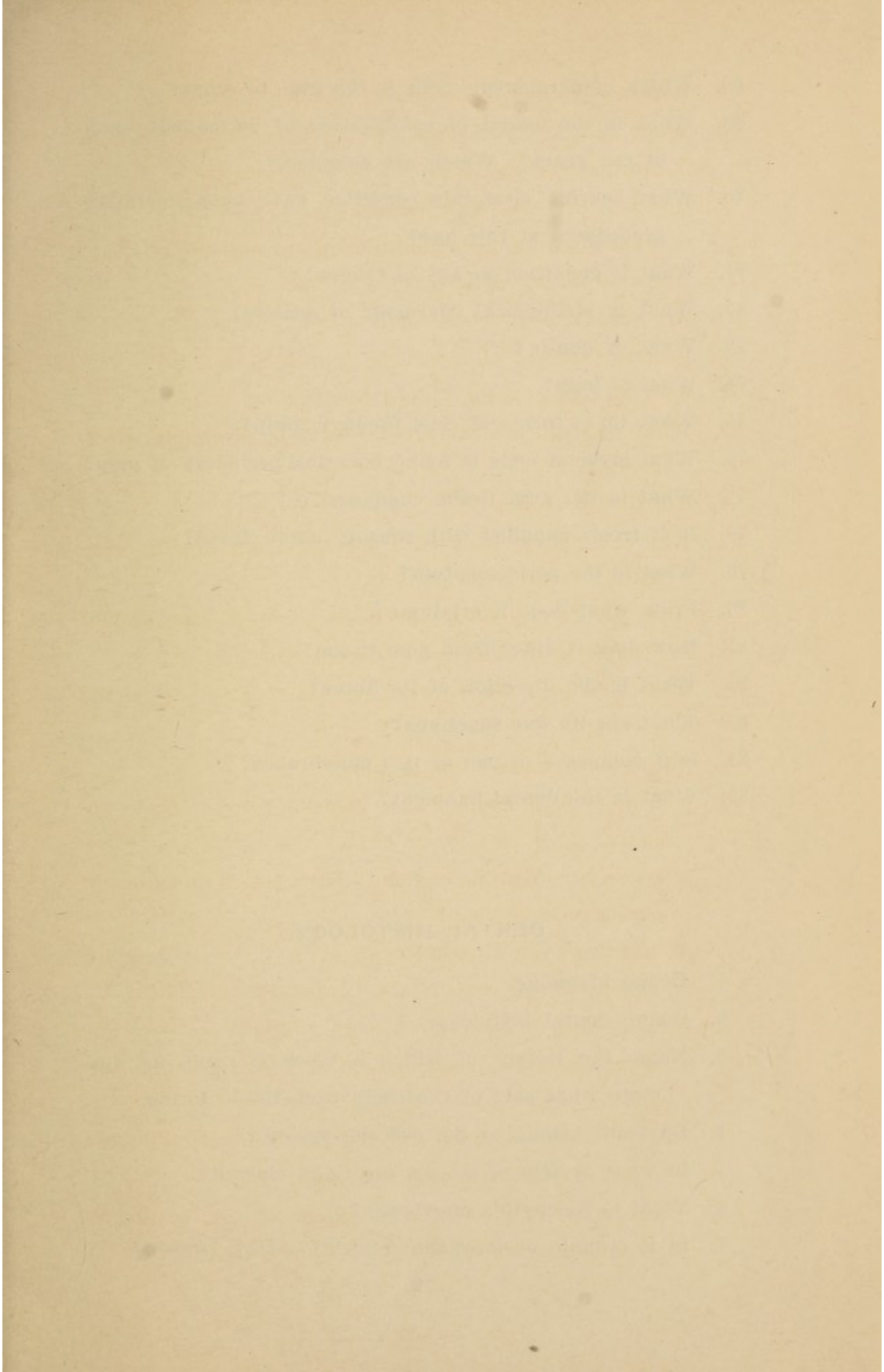
9. The ninth part of the report is devoted to a detailed examination of the international situation. It is found that the country is in a state of complete international collapse, and that the people are suffering from a severe shortage of international relations. The people are also suffering from a severe shortage of international trade, and many are being forced to live in a state of isolation and poverty.

10. The tenth part of the report is devoted to a detailed examination of the future of the country. It is found that the country is in a state of complete future collapse, and that the people are suffering from a severe shortage of hope. The people are also suffering from a severe shortage of a better future, and many are being forced to live in a state of despair and hopelessness.

23. What form does it take first?
24. What causes enamel cord to become bulbous?
25. What cells are proliferated within the enamel organ sac or pouch?
26. What is the form of the infant cells at this time?
27. What is the form of epithelial cells in the bulbous enamel organ?
28. What form do they afterward take?
29. What now makes its appearance in the connective tissue of mesoblast?
30. What change of form in enamel organ is caused by growth of papilla?
31. Describe further changes that take place in enamel organ.
32. How is outer and inner tunic formed?
33. What specialized cells do the infant layer of cells become?
34. What is the stratum intermedium?
35. What is its function?
36. What is the dentinal papilla to become?
37. What now begins to appear in the connective tissue of mesoblast outside of papilla?
38. What is contained in the dental follicle?
39. What has been called the membrana eboris?
40. What is the connection between enamel organ and papilla?
41. What is the name of specialized cells which are to deposit enamel?
42. What is the name of the specialized cells to deposit dentine?
43. Which cells appear first?
44. Which is deposited first, enamel or dentin?



45. Describe method of deposit of enamel.
46. When rods are completed, what change takes place in ameloblasts, and what do they become?
47. In what direction does enamel grow?
48. In what direction does dentin grow; at expense of what?
49. Are ameloblasts persistent?
50. Are odontoblasts persistent?
51. Describe method of deposit or growth of dentin.
52. At what age in embryo does calcification begin?
53. What specialized cells are involved in formation of cementum?
54. Are they persistent?
55. Where and how does cord for permanent teeth originate? Spiral form of, why?
56. What are interglobular spaces and how do they occur?
57. Do enamel cells themselves calcify?
58. What substance lies between enamel rods? Is it calcific or vital?
59. Hardness of enamel due to what?
60. Is enamel of a man's tooth harder or softer than woman's?
61. What is the condition of temporary teeth as to extent of calcification at birth?
62. At what age are all complete?
63. What becomes of roots of the temporary teeth?
64. What organs or cells effect their solution?
65. At what age does decalcification of temporary roots begin?
66. Is it advisable to lance the gums over temporary tooth being erupted with difficulty, and why?
67. What is the condition as to extent of calcification of permanent teeth at birth?



68. Which of permanent teeth is the first to erupt?
69. What is the extent of calcification of permanent teeth at ten years? Which are complete?
70. What bearing does this condition have upon operative procedures at this age?
71. What is condition at age of twelve?
72. What is histological character of enamel?
73. What of dentin?
74. What of pulp?
75. What three forms of cells found in pulp?
76. What layer of cells is found covering periphery of pulp?
77. What is the gum tissue composed of?
78. Is it freely supplied with sensory nerve fibres?
79. What is the pericementum?
80. From what does it originate?
81. How does it differ from gum tissue?
82. What is the direction of its fibres?
83. What are its five functions?
84. Is it composed of one or two membranes?
85. What is the dental ligament?

DENTAL HISTOLOGY.

1. Define histology.
2. Define dental histology.
3. Name the tissues of which a tooth is made up and state what part of the tooth each tissue forms.
4. Do teeth belong to the osseous system?
5. In what system of tissues are teeth classed?
6. What is Nasmyth's membrane?
7. Is it organic or inorganic (calcic)? How proven?

1. The first part of the paper is devoted to a general
discussion of the problem of the origin of life.
2. The second part is devoted to a discussion of the
problem of the origin of the human race.
3. The third part is devoted to a discussion of the
problem of the origin of the human mind.
4. The fourth part is devoted to a discussion of the
problem of the origin of the human body.
5. The fifth part is devoted to a discussion of the
problem of the origin of the human soul.
6. The sixth part is devoted to a discussion of the
problem of the origin of the human spirit.
7. The seventh part is devoted to a discussion of the
problem of the origin of the human intellect.
8. The eighth part is devoted to a discussion of the
problem of the origin of the human will.
9. The ninth part is devoted to a discussion of the
problem of the origin of the human emotions.
10. The tenth part is devoted to a discussion of the
problem of the origin of the human passions.
11. The eleventh part is devoted to a discussion of the
problem of the origin of the human desires.
12. The twelfth part is devoted to a discussion of the
problem of the origin of the human fears.
13. The thirteenth part is devoted to a discussion of the
problem of the origin of the human hopes.
14. The fourteenth part is devoted to a discussion of the
problem of the origin of the human dreams.
15. The fifteenth part is devoted to a discussion of the
problem of the origin of the human thoughts.
16. The sixteenth part is devoted to a discussion of the
problem of the origin of the human feelings.
17. The seventeenth part is devoted to a discussion of the
problem of the origin of the human actions.
18. The eighteenth part is devoted to a discussion of the
problem of the origin of the human words.
19. The nineteenth part is devoted to a discussion of the
problem of the origin of the human deeds.
20. The twentieth part is devoted to a discussion of the
problem of the origin of the human life.

8. How many Nasmyth's membrane, or the **cuticula dentis**, frequently prove a source of danger to teeth of the young?*
9. What is the chemical composition of enamel?*
10. What per cent of enamel is organic matter?
11. Of what structural elements is enamel made up?
12. Describe shape, direction, and arrangement of the enamel rods.
13. How are the rods held together?
14. Is the intercement substance organic or inorganic?
How proven?
15. What bearing do these facts have upon operative procedures in cavity preparation?
16. Describe the physical structure of dentin.
17. What is the shape and direction of the dental tubules?
18. What do the tubules contain in a vital tooth?
19. Where is the origin or source of the fibrils found in the dental tubules known as **Tome's fibrils**?
20. What bearing does the presence of these fibrils have upon operative procedures in cavity preparation?
21. What is the chemical composition of dentin?*
22. What is the proportion of organic and inorganic matter in dentin?
23. What is the "granular layer of **Tomes**" and where is it found?
24. What effect does this granular layer have upon the progress of caries?
25. What is secondary dentin and how and under what conditions is it formed?
26. What tissue of the body does cementum most resemble?
27. How does it differ from bone?
28. What is the function of the cementum?

THE HISTORY OF THE
REIGN OF
HIS MOST EXCELLENT MAJESTY
GEORGE THE THIRD
BY
SAMUEL JOHNSON
ESQ.
OF
ST. JAMES'S PLACE, LONDON.
IN TWO VOLUMES.
LONDON:
PRINTED BY A. MILLAR, IN ST. JAMES'S STREET;
AND BY R. DODD, IN ST. MARTIN'S LANE.
MDCCLXXIII.

ALEXANDER AND GIBBS, OF THE HAND CRAFT
TOWNS
THE HISTORY OF THE
REIGN OF
HIS MOST EXCELLENT MAJESTY
GEORGE THE THIRD
BY
SAMUEL JOHNSON
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MDCCLXXIII.

29. What is the shape of the pulp in young teeth?
 30. Of what tissues is the pulp made up?
 31. Where are the odontoblastic cells found, and what is their function?
 32. What bearing does the functional activity of the odontoblasts have upon operative procedures in cases of deep-seated caries?
 33. What are the functions of the pulp?*
 34. From what source does the pulp derive its blood supply?
 35. What is the alveolo-dental periosteum and where is it found?
 36. Is this a single or a double membrane?*
 37. What is the principal function of this membrane?*
 38. What is the vital function of this membrane?*
 39. What is the sensory function of this membrane?*
 40. Of what structures is this membrane made up?*
 41. What four classes of cells appear in this membrane?*
 42. Describe the arrangement of the fibers of the alveolo-dental membrane and state the purpose of such arrangement.*
-

AFFECTIONS AND DISEASES OF THE HARD DENTAL TISSUES.

1. May enamel properly be said to be subject to diseased conditions?
2. If not, why not?
3. What are the affections to which enamel is liable?
4. What is "mechanical abrasion?"
5. Name several causes or sources of mechanical abrasion.
6. What is "erosion" of enamel?
7. How does erosion differ from mechanical abrasion?

8. What is the cause of erosion?
9. What treatment would you prescribe for erosion?
10. What reparative treatment would you prescribe for erosion and mechanical abrasion?
11. What are enamel stains or discolorations and name several causes of?
12. How would you treat enamel stains?
13. What is "atrophy" of the enamel and its cause?
14. May dentin properly be said to be subject to diseased conditions?
15. Give a reason for your answer.
16. Into what two general divisions may diseases of the dentin be divided?
17. What is meant by a "constructive disease" of the dentin?
18. Where is the secondary dentin deposited in this affection of the dentin?
19. What is the cause of this diseased condition?
20. What is meant by a "destructive disease" of the dentin?
21. Name several destructive diseases of the dentin.
22. Destructive diseases are divisible, according to causation, into what three classes?
23. Name those due primarily to chemical action.
25. Name one due primarily to the action of physical forces.
26. Name one due to vital causes.
27. How do abrasion and erosion differ in their action as to rapidity, in enamel and dentin?
28. What structural change in the dentin is associated with erosion and abrasion?
29. What is the cause of resorption of dentin?
30. Does resorption operate from within the tooth or from the exterior?

—Reference: Burchard's Dental Pathology and Therapeutics.

CARIES.

1. Define dental caries.*
2. Does it have its beginning on the surface of tooth or within?
3. What are the gradations of color presented?
4. What does color indicate as to rapidity of progress?
5. Is dental caries merely a condition or a specific disease?
6. Is it an ancient or a modern disease?
7. How ancient is it supposed to be?*
8. What were some of the earliest theories as to the cause of dental caries?*
9. What observations disproved the vital or inflammatory theory?
10. How was the electro-chemical theory disproved?
11. What are the two classes of causes of caries?
12. What is meant by a predisposing cause of a disease?
13. What is meant by an exciting cause?
14. What is the accepted exciting cause of dental caries?
15. By whose experiments was this theory of the etiology of dental caries demonstrated to be true?
16. By what experiments did Prof. W. D. Miller prove that the acid associated with dental caries was produced by an organized living ferment?*
17. How did he establish the fact that the fermentative germ resided in the saliva and not in the starch?*
18. How did he prove the germ to be reproductive?*
19. How did he determine the acid produced to be lactic acid?*
20. Is dental caries produced by a specific germ?
21. Out of eighteen varieties of bacteria examined by Prof. Miller how many were found to produce lactic acid?

1. The first part of the paper is devoted to a general
discussion of the problem. It is shown that the
problem is of great importance in the theory of
the differential equations of the second order.
The second part of the paper is devoted to a
detailed study of the problem. It is shown that
the problem is of great importance in the theory
of the differential equations of the second order.
The third part of the paper is devoted to a
detailed study of the problem. It is shown that
the problem is of great importance in the theory
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of the differential equations of the second order.

22. What two classes of fungi operate in conjunction to produce dental caries?
23. What is the function of zymogenic bacteria in the production of caries?
24. What is the function of the saprophytic bacteria?
25. What conditions about the teeth in the human mouth favor the production and growth of micro-organisms of caries?
26. Are these micro-organisms animal or vegetable?
27. What pabulum or food substance is essential to the growth of the fungus of caries?
28. What is the chief source of the supply of sugar from which fungus derives its nourishment?
29. Is oxygen necessary to its existence?
30. If oxygen is not necessary to the life of the fungus, why is it that a filling which excludes air and moisture but incloses in the cavity a number of these micro-organisms will preserve the tooth from further decay?
31. What terms are used to designate those forms of bacteria which exist with or without oxygen?*
32. How do the germs of caries begin their attack upon enamel on smooth surfaces?
33. What is the manner of attack in case of pits and fissures?
34. How does the disease progress after the dentin is reached?
35. What is the effect upon the dental tubules?
36. Which operates in advance—the micro-organisms or the lactic acid?
37. Name some forms of micro-organisms found in carious matter.

1. The first of these is the fact that the
2. second is the fact that the
3. third is the fact that the
4. fourth is the fact that the
5. fifth is the fact that the
6. sixth is the fact that the
7. seventh is the fact that the
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11. eleventh is the fact that the
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13. thirteenth is the fact that the
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19. nineteenth is the fact that the
20. twentieth is the fact that the

38. What is the effect of an excess of lactic acid upon the micro-organism?
39. What influences control the accumulation of an excess of acid?
39. What is the essential difference between chemical abrasion or erosion and true caries?
40. Name some predisposing causes of caries.*
41. Name several constitutional predisposing causes.*
42. What is meant by faulty formation? What are two kinds of?
43. Are soft teeth (so-called) more predisposed to caries than hard teeth, or is it more in the environment?
44. In which (hard or soft teeth) will progress of caries, when once begun, be most rapid?
45. How does manner of proximate contact affect liability to caries?
46. Why should sickness, pregnancy, etc., be considered as predisposing causes of caries?
47. Is caries hereditary, and if not, how does heredity act as a predisposing cause?
48. How do acid saliva and mucus act as predisposing causes?
49. Why should mal-position of the teeth act as a predisposing cause of caries?
50. How does the wearing of partial plates act as a predisposing cause?
51. Why should lack of exercise and lack of cleanliness act as predisposing causes?
52. What is the effect of the healthy gum septum upon the progress of caries beneath it?
53. What is the effect of the presence of pus in the immediate neighborhood of caries?

CHAPTER I. THE DISCOVERY OF AMERICA.

1492

Christopher Columbus discovered America in 1492.

He sailed from Spain on August 3rd, 1492.

He reached the island of San Salvador on October 12th, 1492.

He named the island San Salvador.

He sailed on for three weeks.

He reached the island of Cuba on October 20th, 1492.

He named the island Cuba.

He sailed on for three weeks.

He reached the island of Hispaniola on November 6th, 1492.

He named the island Hispaniola.

He sailed on for three weeks.

He reached the island of Puerto Rico on November 19th, 1492.

He named the island Puerto Rico.

He sailed on for three weeks.

He reached the island of St. John on November 30th, 1492.

He named the island St. John.

He sailed on for three weeks.

He reached the island of St. Thomas on December 13th, 1492.

He named the island St. Thomas.

He sailed on for three weeks.

He reached the island of St. Vincent on December 26th, 1492.

He named the island St. Vincent.

He sailed on for three weeks.

He reached the island of Barbados on January 9th, 1493.

He named the island Barbados.

He sailed on for three weeks.

He reached the island of Antigua on January 22nd, 1493.

He named the island Antigua.

54. Name the four stages of caries.
55. Define what is meant by the incipient or superficial stage.
56. Define what is meant by the Progressive stage.
57. Define what is meant by the Deep-seated stage.
58. Define what is meant by the Complicated stage.
59. Into what four classes are cavities divided as to their points of beginning?
60. Why should pits and grooves in the enamel favor beginning of caries?
61. What proportion of all cavities occur at such points?
62. Why should proximate surfaces favor beginning of caries?
63. What proportion of decays occur upon proximate surfaces?
64. Why should they outnumber all others combined 3 1-3 to 1?
65. Do many cases of caries occur upon unclean smooth surfaces? Why not?
66. With what is decay at the necks of the teeth nearly always associated?
67. Is this class more prevalent in youth or old age?
68. What are some reasons why caries decreases with advancing age?
69. Is caries infectious?
70. What bearing does this fact have upon the importance of prompt and thorough treatment of dental caries?
71. Are teeth of the same class on opposite sides of the mouth equally liable to caries at the same points?
72. Why?
73. Give two reasons for the occasional spontaneous cessation of caries?

It is very difficult to find a single word in the
English language which expresses the
idea of the word used in the above sentence.

1. The word used in the above sentence is a
very rare word in the English language.

2. The word used in the above sentence is a
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74. Is caries most prevalent among meat-eating or vegetable-eating nations?
 75. Is caries of the teeth found in the lower animals?
-

TREATMENT OF CARIES.. EXAMINATION OF TEETH. HAND RESTS AND GUARDS, ETC.

1. Having established the fact that dental caries is excited by lactic acid, which is a by-product of micro-organisms, what three methods of prophylaxis or preventative treatment are suggested?
2. How does thorough cleanliness act as a prophylactic treatment?
3. Is it competent for the dentist to instruct his patients how properly to cleanse their teeth?
4. What are some of the suggestions you would make to patients as to means and methods of cleansing the mouth and teeth?
5. Why is neutralization indicated as a prophylactic treatment?
6. Name some agents you would employ for neutralization and tell how and when they should be used.
7. For what specific purpose would you employ antisepsis?
8. Name several good antiseptics.
9. To what extreme dilution is HgCl_2 still effective in preventing the growth of micro-organisms?
10. How much stronger is HgCl_2 than carbolic acid, or rather, how much more effective as a germicide is HgCl_2 than carbolic acid of same dilution?
11. What is the strongest solution of HgCl_2 , that is safe to use on the hard tissues of tooth?
12. What is the objection to the use of bichloride of mercury as a mouth wash?

1. The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is one of the most important and interesting in the history of science. The author discusses the various theories of the origin of life, and shows that the most probable one is the theory of spontaneous generation. This theory states that life originated from non-living matter, and that it has since developed into the various forms of life that we see today.

2. The second part of the paper is devoted to a discussion of the evidence for the theory of spontaneous generation. The author discusses the various experiments that have been conducted to test this theory, and shows that the results of these experiments are in favor of the theory. He also discusses the various observations that have been made of the origin of life, and shows that these observations are also in favor of the theory.

3. The third part of the paper is devoted to a discussion of the implications of the theory of spontaneous generation. The author shows that the theory has important implications for our understanding of the history of life on Earth. It shows that life is not a rare phenomenon, but rather a common one that has arisen many times over the history of the Earth. This has important implications for our understanding of the evolution of life, and for our understanding of the future of life on Earth.

4. The fourth part of the paper is devoted to a discussion of the philosophical implications of the theory of spontaneous generation. The author shows that the theory has important implications for our understanding of the nature of life and the universe. It shows that life is not a divine creation, but rather a natural phenomenon that has arisen from non-living matter. This has important implications for our understanding of the nature of the universe, and for our understanding of our place in it.

5. The fifth part of the paper is devoted to a discussion of the practical implications of the theory of spontaneous generation. The author shows that the theory has important implications for our understanding of the origin of diseases and the development of new drugs. It shows that the theory can be used to help us understand the origin of various diseases, and to develop new drugs to treat these diseases. This has important implications for our understanding of the nature of disease, and for our understanding of the future of medicine.

13. To what extreme dilution is AgNO_3 still effective in preventing the growth of micro-organisms?
14. What is the objection to the use of AgNO_3 for this purpose in the mouth?
15. Name an antiseptic which would be effective and unobjectionable and give formula in which it could be employed as a mouth wash.*
16. Do the filling materials usually employed possess marked antiseptic properties?
17. What filling materials do possess antiseptic properties?
18. What is the action of tobacco on the germs of caries?
19. Name the three therapeutic treatments for dental caries.
20. What drug is the most effective to employ in medication as a therapeutic treatment?
21. In what stage of caries may excision be employed as a therapeutic measure?
22. Describe methods of excision.
23. Upon what principle is filling the cavity of decay in a tooth employed as a treatment for caries?
24. Define the stopping process.*
25. What are the two divisions of the stopping process?
26. What is included in the surgical part?
27. What is included in the mechanical part?
28. Would you call the stopping process a reparative or a curative treatment?
29. How would you proceed to make an examination of a mouth for the purpose of detecting and locating caries of teeth?
30. What appearance would lead you to suspect presence of caries in pits and grooves of teeth?
31. What appearances would indicate caries upon proximate surfaces in close contact?

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32. How would you proceed to examine proximate surfaces?
33. What precaution should be adopted to protect patient from injury from slipping of instrument?
34. Describe several methods of securing hand rests and guards.
35. Name the several grasps employed in properly holding instruments. Illustrate them.
36. To be a skillful operator requires what collateral knowledge and training?*
37. Describe the correct posture of the body of the operator at the chair to permit most effective effort.
38. Make some suggestions as to the hygiene of the operator at the chair.
39. How may the proper use of the mouth mirror contribute to the comfort and hygiene of the operator?
40. Make some suggestions as to the proper bearing of the operator towards his patient.
41. Why is it important to cleanse the teeth of all foreign deposits before undertaking other operations upon them?
42. Give details of procedure in cleaning teeth.
43. What is the technical name of instruments used to remove deposits of salivary calculus?
44. What materials are employed to remove stains from the teeth?
45. Why is it important to thoroughly sterilize instruments?
46. What classes of instruments demand the most careful sterilization?
47. What is the most effective method for the sterilization of steel instruments?
48. How would you sterilize instruments that might be injured by boiling?

49. What would be your advice as to the care of mouth mirrors?
 50. Make some suggestions as to details of cleanliness about the operating chair, the operating table and cabinet.
-

INSTRUMENT NOMENCLATURE.

1. What are the three divisions or parts of a cutting instrument or excavator?
2. Define each part.
3. What is meant by an order name of an instrument?
4. Give examples of order names.
5. What is meant by a sub-order name?
6. Give example.
7. What is meant by a class name? What part of the instrument does it describe?
8. Give examples.
9. What is meant by a sub-class name?
10. Give examples.
11. What is meant by rights and lefts?
12. What are the two varieties of rights and lefts?
13. What is a hatchet excavator?
14. What is a hoe excavator?
15. What is a spoon excavator?
16. Are spoons always rights and lefts?
17. What is a discoid excavator?
18. What is a cleoid excavator?
19. What are chisel excavators?
20. What is meant by the term "monangle excavator"?
21. What is a contra-angle?
22. What is the object to be gained by contra-angling?

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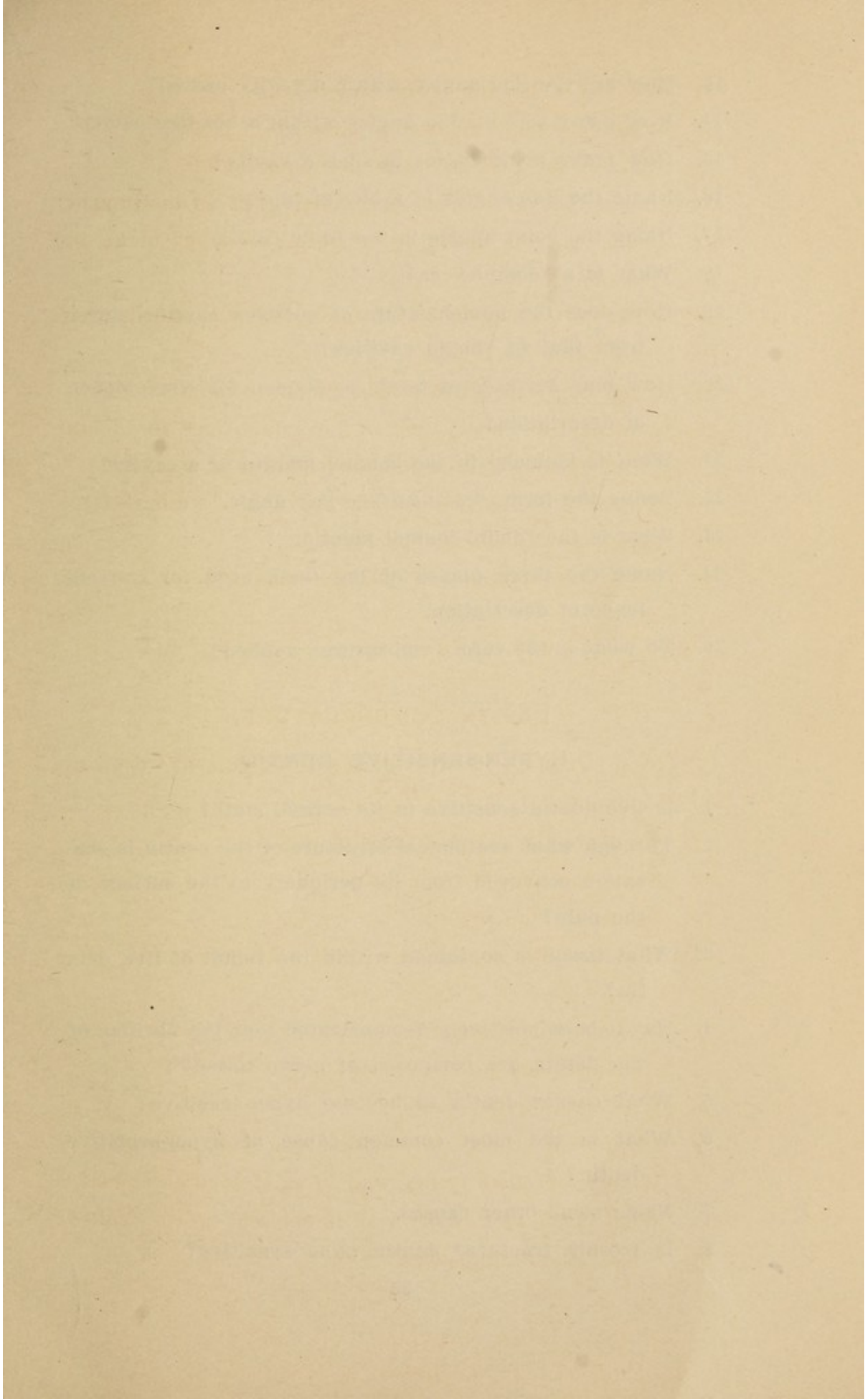
CAVITY RESEARCH

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23. What is a bin-angle-contra-angle?
 24. What is a triple-angle-contra-angle?
 25. What is the first rule for contra-angling?
 26. Give a test for proper contra-angling of an instrument.
 27. Define what is meant by a "formula name" of an instrument.
 28. What do the figures of a formula indicate, and in what terms?
 29. When is a fourth figure used in the formula?
 30. Who devised the system of formula names for dental instruments and arranged excavators in sets?
 31. Which of the excavators are known as "ordinaries"?
 32. Which are known as "specials"?
 33. Which are classed as "side instruments"?
-

CAVITY NOMENCLATURE.

1. From what do cavities derive their names? Give examples.
2. What are the axial surfaces of teeth?
3. Name the axial surfaces of a molar.
4. Define a "line angle."
5. How are line angles on a tooth surface named? Give example.
6. Define a "point angle."
7. How are point angles named?
8. What is an axial cavity"?
9. From what do walls of cavities take their names?
10. What is the fifth cavity wall in axial cavities called?
11. What is the fifth cavity wall in occlusal cavities called?
12. What is the "sub-pulpal wall"?



13. How are the line angles within a cavity named?
 14. How many sets of line angles within a box-like cavity?
 15. How many point angles in such a cavity?
 16. Name the line angles in a buccal cavity.
 17. Name the point angles in the same cavity.
 18. What is a "complex cavity"?
 19. How does the nomenclature of complex cavities differ from that of simple cavities?
 20. How may surfaces of teeth be divided for convenience of description?
 21. What is included in the enamel margin of a cavity?
 22. Define the term, "cavo-surface line angle."
 23. What is the "dento-enamel junction"?
 24. Name the three planes of the teeth used for convenience of description.
 25. To what is the term "embrasure" applied?
-

HYPER-SENSITIVE DENTIN.

1. Is live dentin sensitive in its normal state?
2. Through what anatomical structure of the dentin is sensation conveyed from its periphery to the surface of the pulp?
3. What tissue is contained within the tubuli of live dentin?
4. Has it been positively demonstrated that the fibrillae of the dentin are composed of nerve tissue?
5. What causes dentin to become hyper-sensitive?
6. What is the most common cause of hyper-sensitive dentin?
7. Name some other causes.
8. Is freshly fractured dentin hyper-sensitive?

1. The first part of the paper is devoted to a general
discussion of the problem. It is shown that the
problem is of great importance in the theory of
the differential equations of the second order.
2. In the second part the author considers the
case of a linear differential equation of the second
order with constant coefficients. It is shown that
the problem is solvable in this case.
3. In the third part the author considers the
case of a nonlinear differential equation of the second
order. It is shown that the problem is solvable in
this case as well.
4. In the fourth part the author considers the
case of a differential equation of the second order
with variable coefficients. It is shown that the
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case of a differential equation of the second order
with variable coefficients. It is shown that the
problem is solvable in this case as well.

9. At what point in dentin is found the most sensitive zone, and why?
10. What relation exists between the color of caries and hyper-sensitive dentin? Explain why the light colors are most sensitive.
11. What conditions have a modifying influence on hyper-sensitive dentin?
12. Explain how the rapidity of progress of caries may modify hyper-sensitivity of dentin.
13. In what way may density of the tooth substance influence hyper-sensitive dentin?
14. How may the age of an individual influence hyper-sensitivity of dentin?
15. In what several ways may the state of health of the individual influence the degree of hyper-sensitivity of dentin?
16. What are the four classes of treatment for hyper-sensitive dentin?
17. What is meant by a "therapeutic" treatment, and give examples?
18. Give examples of chemical treatment.
19. Explain how coagulants act in reducing sensitivity of dentin?
20. Explain the principle upon which warm air acts as a remedy.
21. Describe method of application of warm air as a remedy.
22. Explain the action of caustic potash and carbolic acid when used as a remedy and what precautions should be observed.
23. Explain the action of formaldehyde when used in combination as a remedy.

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24. Explain the action of chloride of zinc. In what two ways does it act in reducing hyper-sensitivity of dentin? What precautions to be observed in its use?
25. Explain the action of silver nitrate used as a remedy and state objection to its use.
26. Should arsenic ever be used for this purpose?
27. Is it advisable to use general anaesthesia in excavating hyper-sensitive dentin?
28. What is the most effective way of producing anaesthesia of dentin?
29. What is "cataphoresis"?
30. What are the positive and negative poles called?
31. What is the unit of strength or flow?
32. What is the unit of pressure?
33. What is the unit of resistance?
34. Why is resistance between battery and patient necessary, and how is it controlled?
35. What strength of cocaine solution should be employed?
36. Describe in detail method of application of cataphoresis.
37. What are some of the objections to the use of cataphoresis?
38. Can anaesthesia of the dentin be produced by mechanical pressure forcing cocaine in solution into the tubules?
39. Describe some ways of doing this.
40. What is meant by the "mechanical" treatment of hyper-sensitive dentin?
41. Which acts most effectively in reducing hyper-sensitivity of dentin, metallic or non-metallic temporary fillings?

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42. What takes place under fillings to produce a favorable effect upon hyper-sensitive dentin?
 43. How would you treat mild cases of hyper-sensitive dentin?
 44. What influence does temperament have upon this condition?
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PREPARATION OF CAVITIES.

1. Why is it desirable to separate teeth previous to preparing proximate cavities? The two objects to be gained?
2. What are the three classifications of methods of separation according to speed?
3. By what means is immediate separation accomplished?
4. By what means is rapid separation accomplished?
5. By what means is slow separation accomplished?
6. What is the objection to the use of rubber wedges?
7. What procedure is frequently necessary after using a rubber wedge?
8. What is the objection to the use of wooden wedges?
9. When is it permissible to use the file for separating teeth?
10. How would you treat superficial decay?
11. What procedures are included in preparation of cavities?
12. Name the six classes of cavities into which they are divided according to treatment in preparation.*
13. What are the two great divisions into which all cavities are classed?*
14. Which of the six classes of cavities belong to the great class of smooth surface cavities?

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15. In what locations do we find cavities of the first class?
16. By what means may the operation of preparing cavities be expedited, avoiding confusion and haste?
17. What are the four steps in cavity preparation?*
18. What is meant by "gaining access"?
19. What is meant by "retention form"?
20. What is meant by "resistance form"?
21. What is included in the management of enamel margins?
22. In the rules for preparation of enamel margins what is Rule 1 for extension of margins?*
23. Is there any exception to this rule?
24. What is Rule 2 referring to further extension?
25. What is Rule 3 referring to "self cleansing" margins?
26. What is Rule 4 referring to relation of cavity margin to a developmental groove?
27. What is Rule 5 referring to extension to include developmental grooves, etc.?
28. What is Rule 6 referring to outlines of margins?
29. What is Rule 7 referring to relations of labial, buccal, and lingual margins to each other and to the seat?
30. What is Rule 8 as to final management of margins?
31. What is included in "cavity toilet"?
32. What is meant by the term "crushing strain"?*
33. What constitutes the "seat" in a cavity?*
34. What is meant by the term "step" in cavity preparation?*
35. What is the rule for arrangement of "seat" and "step"?*
36. What is meant by the term "extension for prevention"?*
37. What is meant by the term "affected dentin"?*
38. What is meant by the term "infected dentin"?*

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39. What are the four varieties of carious matter found in cavities in teeth?*
40. What is a simple cavity?
41. What is a complex cavity?
42. What instruments would you use and how would you proceed to gain access to a cavity of the first class?
43. What physical arrangement of what anatomical structure of the tooth do you take advantage of in gaining access to a cavity of the first class?
44. What instruments would you employ and how would you proceed in the second step in the preparation of cavities of the first class?
45. How do you obtain retention form in cavities of class 1?
46. What are the two rules for obtaining retention form in cavities of class 1?*
47. How is resistance form given to a simple occlusal cavity?
48. Why is resistance form necessary in such a cavity?
49. What instruments would you employ and how would you form the enamel margins in this class of cavities?
50. Why would you bevel the margins?
51. Is extension for prevention necessary in cavities of class 1?
52. In cases of deep-seated caries how much of the carious matter should be removed?
53. What medication would be advisable after excavating deep-seated caries and for what purpose?
54. What instruments would you use and how would you proceed to prepare a cavity of the second class?

55. Where is the most frequent location of cavities of the second class?
56. What retention form is required in cavities of the second class and how obtained?
57. Is resistance form needed in such cavities?
58. Is extension for prevention necessary?
59. What would be your management of enamel margins in cavities of class two?
60. What is meant by "convenience form"?*
61. Under what circumstances and for what purpose is convenience form required in cavities of the first and second classes and how obtained?
62. In the preparation of cavities of the third class what is the first procedure and why necessary in most cases?
63. By what means may separation of incisors be accomplished?
64. Where both labial and lingual walls are intact in cases of cavities of the third class in upper incisors how would you proceed to open into such cavities?
65. Is the preservation of the labial wall in certain cases warranted as a prophylactic measure or for esthetic reasons only?
66. What instrument would you use to gain access to such a cavity and describe grasp and guard you would employ?
67. With what instruments and how would you proceed with the second step in the preparation of a cavity of the third class?
68. What provision would you make for retention form in such a cavity, where would you locate such provisions and with what instruments would you make them?

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69. Where should the gingival wall be placed?
70. If a groove is made in the gingival wall at what point relative to the dento-enamel junction should it be located?
71. What is the preferable form of the gingival wall labiolingually and from the axial wall to the cavo-surface angle?
72. In cases of normal occlusion how is provision made for resistance form in cavities of class three?
73. At what points in cavities of the third class is extension for prevention necessary?
74. What should be the form of the axial wall, how modified in case of probable near approach to pulp and how placed relative to the labial and lingual enamel walls?
75. What would be your management of the enamel margins in this cavity; what instruments would you use? If a chisel is employed in what direction on the margins should it be used?
76. What modification in the preparation of cavities of the third class is called for in the lower incisors?
77. When the preparation of cavities in these cases exposes the gold upon the labial surfaces only slightly what further extension is called for and for what purpose?
78. In cavities of the fourth class what modification is called for in the preparation at the gingival wall?
79. In removing a frail incisal angle, mesial or distal, to what line on labial surface should it be cut? What instrument is used?
80. What should be the outline of the margin or labial surface when completed?
81. How is resistance form obtained in such a cavity? Describe procedure and instruments used.

1. The first part of the paper is devoted to a general
2. introduction of the subject, and to a statement of the
3. objects of the investigation. It is shown that the
4. problem is of great importance, and that it has
5. not been completely solved. The author then
6. states the results of his own researches, and
7. compares them with those of other writers.
8. The second part of the paper is devoted to a
9. detailed account of the experiments which were
10. performed. It is shown that the results are
11. in good agreement with those of other writers,
12. and that they confirm the conclusions which
13. have been drawn from the general theory.
14. The third part of the paper is devoted to a
15. discussion of the results, and to a statement of
16. the author's conclusions. It is shown that the
17. results are in good agreement with those of
18. other writers, and that they confirm the
19. conclusions which have been drawn from the
20. general theory. The author then states his
21. conclusions, and states that they are in good
22. agreement with those of other writers. The
23. paper concludes with a statement of the author's
24. acknowledgments, and with a list of references.

82. How does preparation of the step differ in a tooth with thin cutting edge and one with thick cutting edge?
83. What would be the procedure in preparation of step in case of incisor with abraded incisal edge?
84. How do cavities of the fifth class rank with other classes as to difficulty of proper preparation?
85. Describe procedure and instrumentation in opening into a cavity in the mesial surface of a lower first molar.
86. What margins should be extended and how far, in putting into practice the principles of extension for prevention?
87. What is a good rule for determining how far into embrasures the labial and lingual walls should be extended for prevention?*
88. What provision should be made in the gingival wall for retention form and how is it accomplished?
89. If convenience points for starting a gold filling are required in the gingival wall, where should they be located and how formed?
90. Should the buccal and lingual walls be undercut? If so, how is it done and at what point?
91. How is resistance form obtained in this cavity?
92. Describe instrumentation in preparing the step?
93. What relation should the floor of the step and the gingival wall bear towards each other and to the direction of stress of mastication?
94. What should be the form of the gingival wall buccolingually and from the axial wall to the cavo-surface angle?
95. What would be your management of the enamel margins in this cavity?
96. What instruments are used to bevel the gingival margin?

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internal affairs of the country.

97. In large mesio-occluso-distal cavities in bicusps, what precaution should be practiced in reference to the lingual cusp?
98. Where, in such a case, the tooth is pulpless, what would be good practice in reference to both cusps?
99. At what stage in the preparation of cavities is it advisable to put on the rubber dam?
100. What are the objects to be attained by the use of the rubber dam?
101. What preliminary steps should be taken preparatory to the placing of the rubber dam?
102. How are holes properly made in the rubber dam and what is the rule as to spacing of holes?
103. Name the two sides of the rubber dam as suggested by their position when placed on the teeth?
104. How many teeth should be included and how would you proceed to adjust the dam in case of cavities upon the mesial surfaces of the upper central incisors?
105. How is the dam retained in position about the necks of the incisors and what auxiliary appliances are used to hold it in proper position?
106. How would you proceed to adjust the dam for filling a cavity in the mesial surface of an upper first molar? How many and what teeth should be included?
107. How is the dam retained upon a molar?
108. What precautions should be used in removing the rubber dam?
109. What means, other than the rubber dam, may be employed for maintaining dryness in minor operations? Give details of application.
110. How would you prepare a cavity of the sixth class occurring upon incisal edge of an incisor? What instruments would you use?

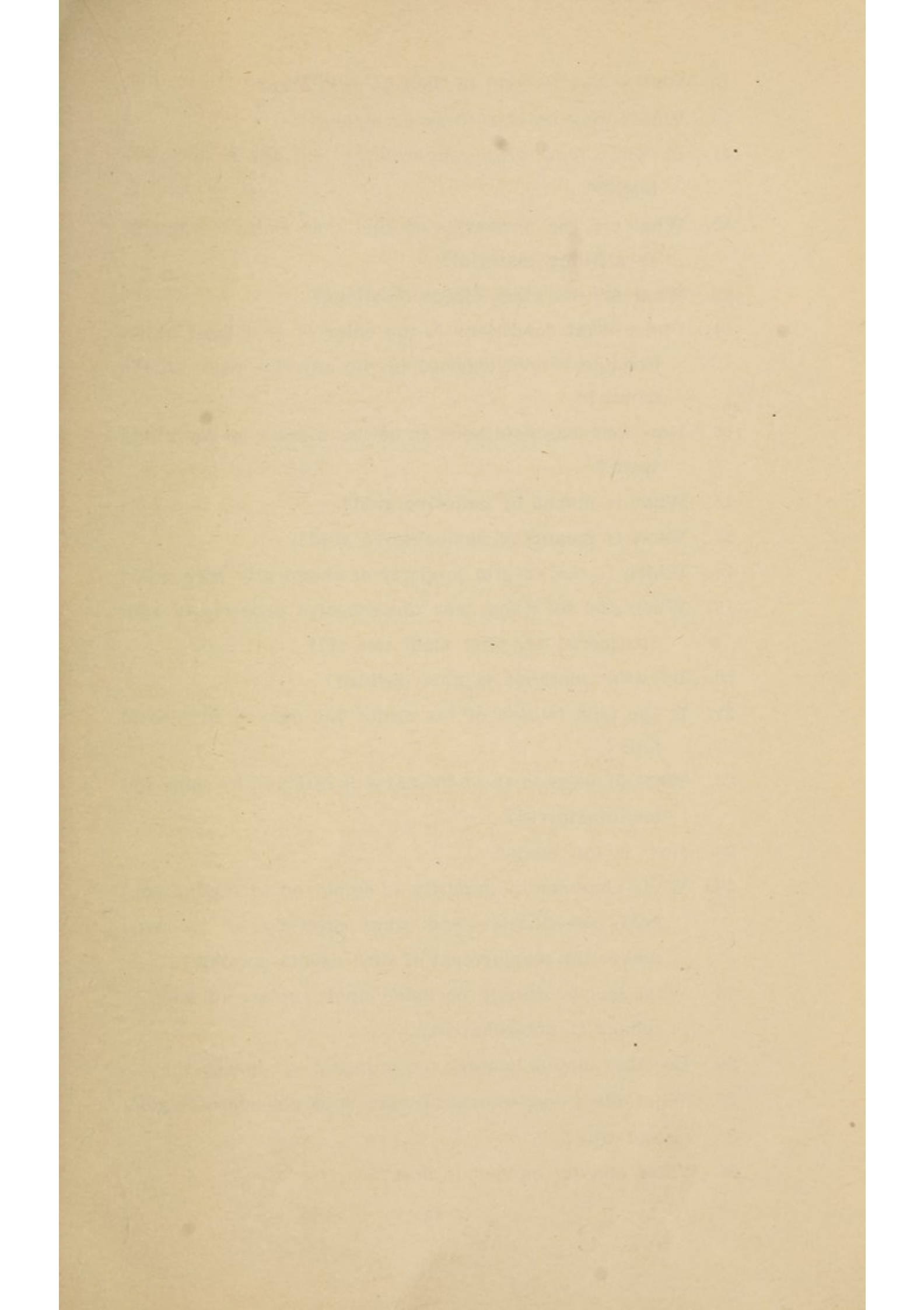
What is the purpose of this study?
The purpose of this study is to determine the effect of the independent variable on the dependent variable.
The independent variable is the variable that is manipulated or changed by the researcher.
The dependent variable is the variable that is measured or observed by the researcher.
The study was conducted in a laboratory setting.
The results of the study show that there is a significant difference between the two groups.
The data was analyzed using a t-test.
The findings of this study suggest that the independent variable has a positive effect on the dependent variable.
Further research is needed to confirm these results.

THE EFFECT OF THE INDEPENDENT VARIABLE ON THE DEPENDENT VARIABLE
The purpose of this study is to determine the effect of the independent variable on the dependent variable.
The independent variable is the variable that is manipulated or changed by the researcher.
The dependent variable is the variable that is measured or observed by the researcher.
The study was conducted in a laboratory setting.
The results of the study show that there is a significant difference between the two groups.
The data was analyzed using a t-test.
The findings of this study suggest that the independent variable has a positive effect on the dependent variable.
Further research is needed to confirm these results.

111. When is it advisable to employ retaining screws in this class of cavities?
 112. What special preparation is called for in cavities for porcelain or gold inlays?
 113. What is the difference in preparation of enamel margins for porcelain and a gold inlay?
 114. How does the preparation of a cavity to receive an amalgam filling differ from that for a gold filling? Difference as to margins and why?
 115. What medication should be applied to the walls of cavities after completion of preparation, where the dentin has been hyper-sensitive and for what purpose?
 116. What other medication is sometimes advisable and for what purpose?
-

FILLING MATERIALS AND FILLING.

1. What are the four general objects in view in filling carious teeth?*
2. What points must be taken into consideration in the selection of filling materials for special cases?*
3. Upon what two things does success in filling teeth depend?
4. What are the three essential qualities of a filling material?
5. Name three other desirable qualities of a filling material.
6. What properties should a filling material possess to make it, in your opinion, the ideal or perfect filling material?
7. Name the filling materials in use.
8. Which of these holds the first place in value?



9. Which may be said to hold second place?
10. Which may be classed as permanent?
11. In what four ways may fillings be said to preserve teeth?*
12. What are the properties of gold that make it valuable as a filling material?
13. What are its chief disqualifications?
14. Under what conditions is the color of gold least objectionable when exposed in the anterior part of the mouth?*
15. How long has gold been in use as a material for filling teeth?
16. What is meant by cohesive gold?
17. What is meant by non-cohesive gold?
18. Which is the natural property of chemically pure gold?
19. When and by whom was the cohesive property of gold discovered and first made use of?*
20. By what methods is gold purified?
21. Is the gold bullion of the mints fine enough for dental foils?
22. What fineness in the 1,000 parts is attained by some foil manufacturers?
23. How is foil made?
24. What characer of impurity is employed to render pure gold non-cohesive and what property of the gold makes the employment of such agents possible?
25. What gas is usually occluded upon surface of gold to render it non-cohesive?
26. Do other metals possess the property of cohesion?
27. What effect does annealing have upon non-cohesive gold, and why?
28. What amount of heat is best?

1. The first thing I noticed when I stepped out of the plane was the fresh air. It felt like a warm blanket after a long flight. The sun was shining brightly, and the birds were chirping happily. I took a deep breath and felt a sense of peace wash over me. The world was so beautiful, and I was so lucky to be here. I smiled and looked around at the people who were also enjoying the day. They were all so happy and carefree, and it made me feel like I had found a new home. I walked towards the beach, and the sand felt so soft under my feet. The waves were crashing against the shore, and the sound was so soothing. I sat down on the sand and watched the sun set over the ocean. It was a beautiful sight, and I felt like I was in the middle of a dream. I closed my eyes and let the sun kiss my face. I was so happy, and I knew that this was the life I wanted. I was free, and I was finally home.

29. Is it always essential that gold foil should be heated to redness to render it cohesive?
30. What precautions should be observed in annealing gold?
31. Describe some methods of annealing gold.
32. In what two ways may annealing of non-cohesive gold render it cohesive?*
33. What treatment of the surface of pure gold foil will render it permanently non-cohesive even when annealed?*
34. What two groups of chemical compounds are especially injurious to gold foil?*
35. What is a common source of these gases?*
36. What chemical is it advisable to keep in the drawer with your gold foil?*
37. In what manner does this chemical protect the surface of gold foil from contamination?
38. What is crystal gold and how is it made?
39. Name some forms in which gold foil is prepared for filling teeth.
40. What forms of preparation are employed when used as non-cohesive gold?
41. Describe method of making foil into cylinders.
42. Upon what does the retention of gold in a cavity depend?*
43. Name the three methods of packing gold into a cavity in a tooth.*
44. Which form or forms of gold, cohesive or non-cohesive, is employed in each method?
45. What are the resistances to be overcome in packing gold requiring the employment of force?*
46. Name the four forms of applied force employed in packing gold.*

47. Describe what is meant by "direct pressure," and when is it employed?
48. What is meant by "wedging," and when is it employed?
49. What is meant by "leverage," and when and how is it employed?
50. What is "percussion," and by what means is it employed?
51. Which forces are the most powerful, and what precaution should be taken in their employment?
52. Name several forms of mallets used in packing gold by percussion?
53. What three objects are to be borne in mind in packing gold into a cavity?*
54. Why is it important that the adaptation of gold should be perfect throughout the walls of cavity as well as at the margins?
55. What bearing does the form of the external surface (as to restoration of contour) of the filling have upon its ultimate success?
56. Is it essential that the greatest possible density of the mass of gold in a filling should be attained to?
57. What risk is incurred in complete condensation of the gold in frail teeth?
58. At what part of a filling is great density desirable?
59. What effect does density have upon thermal conductivity?
60. What kind of plugger points are employed in packing cohesive gold?
61. What kind are used in packing non-cohesive gold?
62. What are foot-pluggers, and when are they employed?

63. What relation does the size or area of the plugger point bear to the impacting power under a given amount of force?*
64. Describe the process of filling a simple cavity in the occlusal surface of a molar with cohesive gold.
65. In packing cohesive gold against a wall of cavity, in what direction with reference to the wall should force be applied, and why?
66. What are the essential points to be observed in making a filling with cohesive gold?
67. What is the principle involved in packing non-cohesive gold into a cavity?
68. In what form should non-cohesive gold be prepared for most efficient employment of the principle involved?
69. Describe the process of filling a simple occlusal cavity with non-cohesive gold.
70. In what classes of cavities may both cohesive and non-cohesive gold be advantageously used, and which portions of each cavity should be filled with which kind of gold?
71. What effect does burnishing have upon a non-cohesive gold filling, and at what stage of the operation should it be used?
72. What effect does burnishing have upon a cohesive gold filling?
73. What precaution should be observed in the use of burnishers?
74. How full should a cavity be packed with gold, and why?
75. What importance attaches to proper finishing of fillings?
76. Describe method of finishing an occlusal filling in a molar.

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 3, 1862. It contains a report on the state of the Union and the progress of the war.

2. The second part is a report from the Secretary of the Treasury, dated January 10, 1862. It contains a statement of the public debt and the revenue of the Government.

3. The third part is a report from the Secretary of the Interior, dated January 15, 1862. It contains a statement of the land and mineral resources of the United States.

4. The fourth part is a report from the Secretary of the Navy, dated January 20, 1862. It contains a statement of the naval forces and the progress of the construction of new ships.

5. The fifth part is a report from the Secretary of the War, dated January 25, 1862. It contains a statement of the military forces and the progress of the war.

6. The sixth part is a report from the Secretary of the State, dated January 30, 1862. It contains a statement of the foreign relations of the United States.

7. The seventh part is a report from the Secretary of the Agriculture, dated February 5, 1862. It contains a statement of the agricultural resources and the progress of the cultivation of the land.

8. The eighth part is a report from the Secretary of the Education, dated February 10, 1862. It contains a statement of the educational resources and the progress of the education of the people.

9. The ninth part is a report from the Secretary of the Commerce, dated February 15, 1862. It contains a statement of the commercial resources and the progress of the commerce of the United States.

10. The tenth part is a report from the Secretary of the Finance, dated February 20, 1862. It contains a statement of the financial resources and the progress of the finance of the United States.

77. Describe method of finishing a filling upon a proximate surface of an upper incisor.
78. What is the most vulnerable point to secondary decay in proximate fillings, and why?
79. When was tin first used as a filling material?
80. What properties of tin render it valuable as a filling material?
81. Has tin any cohesive property?
82. Has it any antiseptic action on tooth substance?
83. What action do oxygen and sulphureted hydrogen have on tin?
84. How is tin prepared for use as a filling material?
85. Does it have any tendency to discolor a tooth?
86. Describe method of making a filling of tin in a simple cavity.
87. How may it be combined with gold?
88. What effect does the gold seem to have upon tin when used in combination?
89. What is an amalgam?
90. Is an amalgam a sub-chemical compound or a mechanical mixture?
91. When was amalgam first used as a filling material?*
92. By whom was it introduced into this country and under what name?*
93. What kind of reception was amalgam given by the profession upon its introduction into this country?
94. What properties of amalgam render it valuable as a filling material?
95. What are some of the objections to the use of amalgam?
96. In what class of cases should it be used?
97. Name the five physical properties peculiar to amalgams.*

the first thing I noticed when I stepped out of the car
was that the air was so fresh and clean. It felt like I
had been in a cage for years and was finally free.
The sun was shining brightly, and the birds were singing
in the trees. I took a deep breath and felt my lungs
expand. I had never felt so alive before.
I walked down the street, looking at all the beautiful
flowers and the colorful houses. The people were so
friendly and welcoming. I felt like I had found a new
home. I had found a place where I belonged.
I had found a place where I was loved.
I had found a place where I was safe.
I had found a place where I was happy.
I had found a place where I was free.
I had found a place where I was home.

98. What causes amalgams to harden or set?
99. How is the degree of expansion or contraction of an amalgam measured?
100. The extent of expansion or contraction of amalgams is due to or influenced by what factors?*
101. How is the so-called tendency in amalgams to "spheroid" explained?
102. What is meant by the "flow" of amalgams under pressure?*
103. Do all metals have tendency to flow under pressure?
104. How does the flow of amalgam differ from that of metals?
105. What is meant by the term "edge strength" as applied to amalgams?
106. What is the purpose of annealing or ageing alloys for amalgams?*
107. How is annealing accomplished?*
108. What effect does annealing of alloys have upon expansion, contraction, flow, edge strength, amount of mercury used, and time of setting of amalgams?*
109. In a silver-tin alloy what proportions of these metals give the most stable amalgam, as to expansion and contraction, when unannealed?
110. What change in the formula of silver-tin alloy would be required when annealed, to give stability to the amalgam?
111. Explain the philosophy of such change in formula being required.
112. In what way are the physical properties of the silver-tin-alloy amalgams modified by the addition to the formula of 5 per cent of gold?*

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113. How does the addition of 5 per cent of platinum modify the silver-tin alloy when amalgamated?
114. How does the addition of 5 per cent of copper affect such an amalgam?
115. What is the effect of zinc 5 per cent when combined with the silver-tin alloy?
116. Give formula for an alloy affording best results as an amalgam, composed of silver, tin, gold and zinc.*
117. Give formula composed of silver, tin, copper and zinc affording best amalgam.
118. What do the terms "binary," "ternary," and "quaternary" mean as applied to amalgams?
119. To which of these does copper amalgam belong?
120. What properties of copper amalgam render it valuable as a filling material?
121. What are the objections to the use of copper amalgam?
122. Describe method of manipulating copper amalgam.
123. Describe method of mixing ordinary amalgam.
124. Describe methods of mixing quick-setting amalgams.
125. What kind of instruments are used for packing amalgam?
126. Describe method of making a simple filling with amalgam.
127. What amount of pressure is necessary in packing amalgam?
128. When should a matrix be employed?
129. Describe some form of matrix and method of application.
130. Describe the finishing of an amalgam filling.
131. How may amalgam be combined with gold, and to what is due the favorable effect of such combination?
132. What is oxy-phosphate of zinc?

133. Describe method of mixing and introduction into cavity.
134. Is dryness essential in making a filling of this material?
135. Under what circumstances is it advisable to use zinc phosphate?
136. What are the defects in it as a filling material?
137. How may a zinc phosphate filling be temporarily protected from the action of saliva while hardening?
138. How may amalgam and oxy-phosphate of zinc be combined as a filling material?
139. What advantages are claimed for such combination?
140. What is oxy-phosphate of copper?
141. What is the color of oxy-phosphate of copper?
142. To what class of cases should it be limited in its use?
143. Describe method of mixing oxy-phosphate of copper.
144. How may the setting of oxy-phosphate of copper be hastened?
145. For what purpose is oxy-sulphate of zinc used in dentistry?
146. What is oxy-chloride of zinc?
147. Describe method of mixing and introduction into cavity.
148. What are the objections to the use of oxy-chloride of zinc as a filling material?
149. For what purposes is it particularly useful in dentistry?
150. To what properties of gutta percha is due its value as a filling material?
151. Describe method of making a filling of gutta percha.
152. For what special purpose is gutta percha useful in operative dentistry?
153. What objectionable change takes place in gutta percha fillings?
154. What is the essential difference between an inlay and a filling?

155. In what classes of cavities are porcelain inlays indicated?
156. What is meant by the term "low fusing" as applied to porcelain?
157. What is meant by the term "high fusing"?
158. Describe method of making a porcelain inlay matrix by means of an impression of the cavity.
159. Describe method without impression.
160. Under what circumstances should the matrix be invested?
161. Describe method of mixing the porcelain body, filling matrix and baking or fusing.
162. To what degree of fusion should the first bakings be carried?
163. In case of approximal cavities in incisors should the shade of the porcelain be slightly darker or lighter than the natural tooth?
164. Which would give the best results in case of labial cavities?
165. What treatment should be given the porcelain surface next to the cavity to aid in its retention?
166. Describe the setting of a porcelain inlay.
167. Describe the finishing of a porcelain inlay.
168. What is the axiom with reference to porcelain edges exposed to stress?
169. In what classes of cavities are gold inlays indicated?
170. What carat and gauge of gold should be used in making the matrix for a gold inlay?
171. Describe method of making a solid gold inlay.
172. By what means is large restoration of contour accomplished?

GENERAL PATHOLOGY AND THERAPEUTICS
INDICATIONS OF THE PULSE

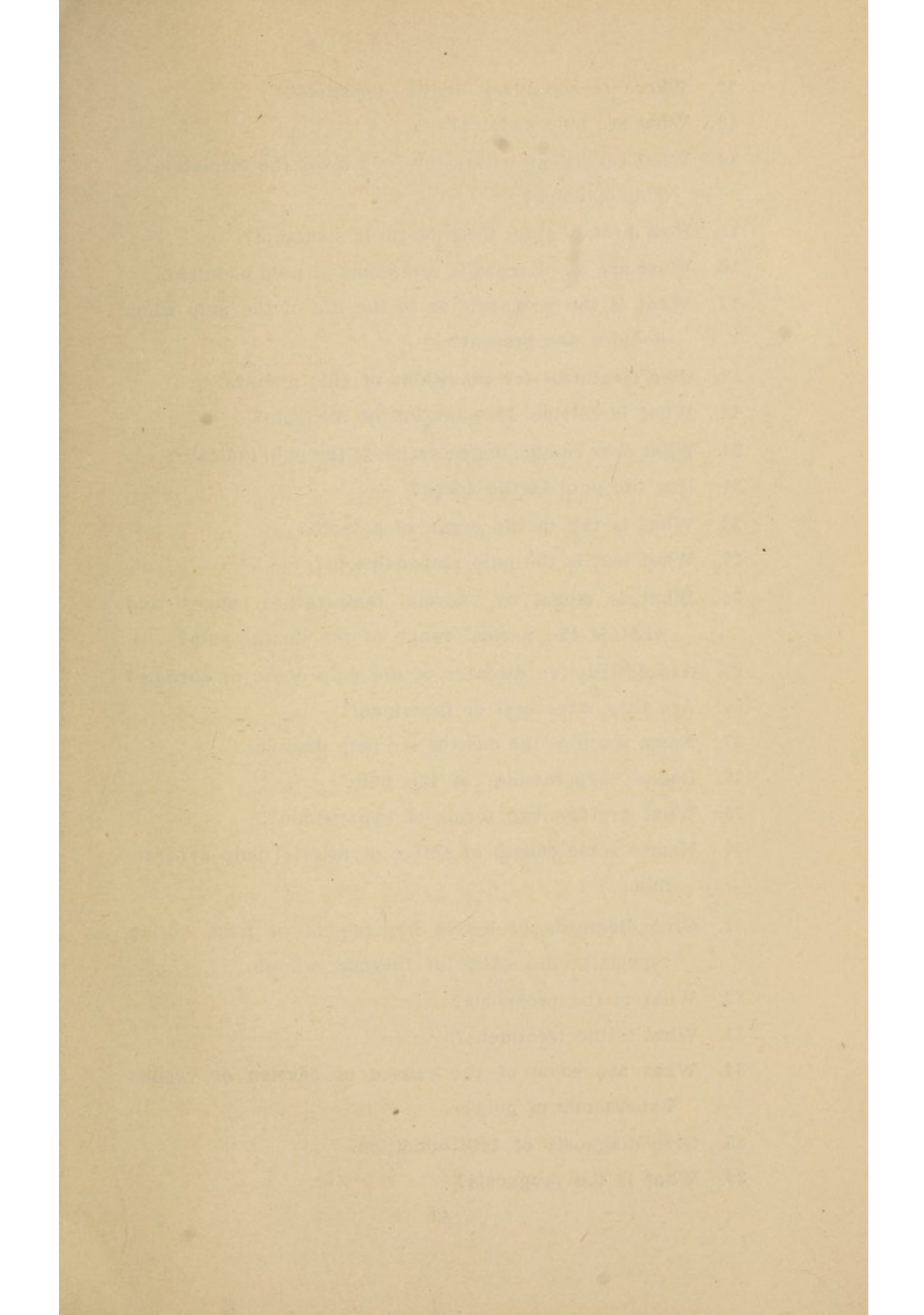
1. The pulse is the most important sign of the state of the system.
2. It is the only sign which can be obtained without the aid of instruments.
3. It is the only sign which can be obtained without the aid of instruments.
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10. It is the only sign which can be obtained without the aid of instruments.

173. Describe method of making the hollow gold inlay.*
 174. What advantages attach to the hollow gold inlay?
 175. In what class of cases is it an advantage to take an impression of the cavity and secure a model?
 176. Describe procedures in setting a gold inlay.
 177. Describe the finishing of a gold inlay.
-

DENTAL PATHOLOGY AND THERAPEUTICS. DISEASES OF THE PULP.

Note: The lectures under this heading follow closely the text in Burchard's Dental Pathology and Therapeutics, to which work the student is directed for further reading and study. The subjects are similarly treated in Marshall's Operative Dentistry with some variations in terminology. No answers to these questions are given in the appendix, with one exception.

1. What are the two general divisions of diseases of the pulp?
2. What are the two divisions as to anatomical features?
3. What are the two divisions as to their character?
4. What are "constructive diseases" of the pulp?
5. What are "destructive diseases" of the pulp?
6. What is the essential difference between these two classes of diseases?
7. Name the forms of constructive diseases of the pulp.
8. Define "tubular dentinification."
9. Name some causes of tubular dentinification.
10. What alteration in appearance takes place in the dentin due to tubular dentinification?
11. What is meant by secondary dentin?



12. Where is secondary dentin deposited?
13. What are pulp nodules?
14. What conditions within the pulp favor the formation of pulp nodules?
15. How do they differ from dentin in structure?
16. What are the diagnostic symptoms of pulp nodules?
17. What is the prognosis as to the life of the pulp when nodules are present?
18. Give treatment for conditions of pulp nodules.
19. What is calcific degeneration of the pulp?
20. What does calcific degeneration of the pulp indicate?
21. Has the pulp tactile sense?
22. What is the tactile organ of a tooth?
23. What test is the pulp responsive to?
24. What is meant by "normal temperature range," and what is the normal range of the dental pulp?
25. Are destructive diseases of the pulp acute or chronic?
26. Are they structural or functional?
27. Name some of the destructive pulp diseases.
28. Define "hyperaemia" of the pulp.
29. What are the two forms of hyperaemia?
30. Name some causes of active or arterial pulp hyperaemia.
31. Give diagnosis of active hyperaemia of pulp, noting especially the effect of thermal stimuli.
32. What is the prognosis?
33. What is the treatment?
34. What are some of the causes of passive or venous hyperaemia of pulp?
35. Give diagnosis of this condition.
36. What is the prognosis?

37. Give treatment of venous hyperaemia.
38. Why is the pulp of a tooth peculiarly susceptible to hyperaemia?
39. What is "pulpitis"?
40. What is the essential feature of inflammation of pulp or pulpitis?
41. How does it differ from hyperaemia?
42. What are the two clinical divisions of pulpitis?
43. What are causes of acute pulpitis?
44. In what ways may bacterial infection occur?
45. Give morbid anatomy.
46. Does swelling ever occur? Under what conditions?
47. Give diagnosis of pulpitis.
48. Give prognosis and treatment.
49. What is "suppuration" of the pulp?
50. What are the two clinical divisions of suppuration?
51. What are the two forms in which suppuration occurs?
52. Give diagnosis of ulceration.
53. Give diagnosis of abscess of pulp.
54. What is the prognosis of abscess of pulp?
55. Give treatment for the latter condition.
56. What is the appearance of the pulp in chronic inflammation or sclerosis?
57. What is "hypertrophy" of the pulp?
58. What is the cause of this condition of the pulp?
59. With what is this condition liable to be confounded?
60. Give treatment.
61. Is this hypertrophied tissue usually very sensitive?
62. Name some methods of devitalization of pulp.
63. Describe method of application of arsenic for this purpose.

1. The first step in the process of the investigation is to determine the nature of the problem.
2. The second step is to collect the data necessary for the investigation.
3. The third step is to analyze the data and determine the cause of the problem.
4. The fourth step is to develop a plan of action to solve the problem.
5. The fifth step is to implement the plan of action.
6. The sixth step is to evaluate the results of the investigation.
7. The seventh step is to report the findings of the investigation.
8. The eighth step is to recommend a solution to the problem.
9. The ninth step is to implement the solution.
10. The tenth step is to monitor the results of the solution.
11. The eleventh step is to evaluate the effectiveness of the solution.
12. The twelfth step is to report the results of the evaluation.
13. The thirteenth step is to recommend a final solution to the problem.
14. The fourteenth step is to implement the final solution.
15. The fifteenth step is to monitor the results of the final solution.
16. The sixteenth step is to evaluate the effectiveness of the final solution.
17. The seventeenth step is to report the results of the final evaluation.
18. The eighteenth step is to recommend a final solution to the problem.
19. The nineteenth step is to implement the final solution.
20. The twentieth step is to monitor the results of the final solution.

64. With what should the arsenic be combined?
65. Is it wise to apply arsenic to an inflamed and aching pulp?
66. What treatment should be instituted first under such conditions?
67. What are the physiological effects of arsenic on the pulp?
68. What amount of arsenic should be used, and how long retained in contact with pulp?
69. What precautions should be observed in making an application of arsenic to a pulp?
70. Name some objections to the use of arsenic.
71. What medication should be given the pulp after removal of arsenic, and for what purpose?
72. Describe method of anaesthetization of pulp with cocaine by the use of pressure preparatory to its immediate removal.
73. What other drug may be employed with pressure for the purpose of destroying the pulp?
74. What instruments are used to remove the pulp tissue after devitalization?
75. Describe method of extirpation of the pulp.
76. What antiseptic precautions should be observed in this operation?
77. What is mummification of the pulp?
78. How may mummification of the pulp be accomplished?
79. Define gangrene of the pulp.
80. What are the two forms in which gangrene of the pulp occurs?
81. Mention some causes of dry gangrene.
82. Give pathology and morbid anatomy of dry gangrene.

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83. What are the symptoms and diagnosis of dry gangrene?
84. Give treatment of this condition.
85. What precautions should be observed in opening into a dry gangrenous pulp?
86. What are some of the causes of moist gangrene?
87. What constitutes the essential difference between dry and moist gangrene?
88. Give diagnosis of moist gangrene.
89. Give the treatment for this condition.
90. What precautions are important to be observed in the treatment of moist gangrene?
91. Into what two general classes, according to causation, may diseases of the pericementum be divided?
92. Into what three classes may they be divided according to location of beginning?
93. What are the symptoms accompanying inflammation of the peridental membrane?*
94. Define "septic apical pericementitis."
95. What are the two general divisions of?
96. What is the most frequent cause of the acute form?
97. What are the symptoms of acute septic apical pericementitis?
98. Give clinical history.
99. Describe procedures in diagnosis.
100. What is the prognosis as to future retention of tooth?
101. Give treatment for this condition.
102. What are the two forms of chronic septic apical pericementitis?
103. What are the symptoms and diagnosis of this condition when without fistula?
104. What name is commonly given this condition when it occurs without fistula?

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105. Give treatment.
106. When a case of chronic septic apical pericementitis refuses to yield to ordinary treatment what surgical procedure should be resorted to?
107. What is the treatment of this condition when a fistula is present?
108. What is the prognosis in each case?
109. What is the cause of the chronic form of septic apical pericementitis or alveolar abscess?
110. Name some causes of non-purulent septic apical pericementitis.
111. Give diagnosis and treatment of this condition.
112. Name some causes of non-septic pericementitis.
113. Describe treatment for this condition.
114. Name some causes of pericemental disease beginning at the gum margin.
115. Describe method of enlarging constricted pulp canals by the use of sulphuric acid.
120. How would you determine when pulp canals are in a condition to be permanently filled?
121. Under what conditions is immediate root filling advisable?
122. What materials are commonly employed for filling root canals?
123. Describe in detail the method of filling the root canal with gutta percha.
124. Describe some other method of permanently filling root canals.

APPENDIX.

Answers to Questions Marked With *.

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Question | |
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| 10 | 8 | The fragmentary remains of Nasmyth's membrane retained at the necks of teeth and in the recesses of interproximal spaces and developmental markings, may catch and hold food debris which by fermentation, would produce caries at those points. |
| 10 | 9 | <p>Von Bibra gives the following analysis of enamel:</p> <p>Calcium phosphate and fluorid.....89.82</p> <p>Calcium carbonate 4.37</p> <p>Magnesium phosphate 1.34</p> <p>Other salts88</p> <p>Cartilage 3.39</p> <p>Fat20</p> <p style="padding-left: 40px;">Total organic 3.59</p> <p style="padding-left: 40px;">Total inorganic96.41</p> <p style="padding-left: 40px;">—American Text Book of Operative Dentistry.</p> <p>Leon Williams claims to have found no trace of organic matter in fully formed enamel.</p> |
| 10 | 21 | <p>Von Bibra gives the following analysis of dentin:</p> <p>Organic matter27.61</p> <p>Fat40</p> <p>Calcium phosphate and fluorid66.72</p> <p>Calcium carbonate 3.36</p> <p>Magnesium phosphate 1.08</p> <p>Other salts83</p> <p style="padding-left: 40px;">—American Text Book of Operative Dentistry.</p> |
| 11 | 33 | <p>The functions of the pulp are:</p> <p style="padding-left: 20px;">Vital—formation of dentin through odontoblasts.</p> <p style="padding-left: 20px;">Sensory—responds to stimuli, thermal or otherwise, but has no sense of touch.</p> |
| 11 | 36 | The alveolo—dental periosteum, or peridental membrane is a single membrane. |
| 11 | 37 | The principle function of the peridental membrane may be said to be its physical function, the means of attachment between the cementum of the root of the tooth and the alveolar process. |

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| 11 | 38 | The vital function of this membrane is the formation of both the cementum of the tooth root and the alveolar process through the action of cementoblasts upon one side and osteoblasts upon the other. |
| 11 | 39 | The sensory function is the sense of touch which resides in this membrane only. |
| 11 | 40 | The peridental membrane belongs to the class of fibrous membranes and is made up of the following elements:
1. Fibers. 2. Fibroblasts. 3. Cementoblasts. 4. Osteoblasts. 5. Osteoclasts. 6. Epithelial structures called glands. 7. Blood vessels. 8. Nerves.
—F. B. Noyes, Amer. Text Book Op. Dent. |
| 11 | 41 | Fibroblasts; cementoblasts; osteoblasts; osteoclasts. |
| 11 | 42 | The fibers of the peridental membrane are attached to the cementum of the root and to the alveolar process and arranged in varying directions in such manner as to best sustain the tooth in its socket and support it against the strain in mastication. See American Text Book of Operative Dentistry, third Ed., p. 96-102. |
| 13 | 1 | Dental caries may be defined as the progressive molecular disintegration of the calcic and organic tissues of the teeth in two stages; first, the solution of the calcic salts by means of lactic acid produced within the mouth by zymogenic microorganisms, and second, the dissolution of the organic matrix through the agency of saprophytic fungi. |
| 13 | 7 | The most ancient human remains ever discovered show evidences of the ravages of dental caries. A mummy in the British Museum, dating back to a period about 2800 B. C. or more than four thousand eight hundred years, shows undisputed evidence of dental caries.
—Marshall. |
| 13 | 8 | 1. The Humoral Theory , held 456 B. C. Hippocrates taught that the body contained four humors; viz., blood, phlegm, yellow bile and black bile, a disturbance of the due proportions of which was |

productive of disease. Dental caries was said to be caused by a stagnation of depraved juices of the teeth.

2. **The Vital or Inflammatory Theory**, originated with Galen (A. D .,131) and was maintained by various authorities down to Hertz and Abbott in the latter part of the nineteenth century. It was held that dental caries was due to inflammation within the tooth resulting in mortification or gangrene of the dental tissues external to the inflamed area. Some writers who advocated this theory claimed that there was another variety of caries which began externally.
3. **The Worm Theory**. Origin not known. It was held that the teeth were destroyed by worms. Probably practiced as a deception as it is to the present day in China, where native dentists pretend to extract the worms (artificial) from aching teeth, thus relieving their wondering but satisfied patients.
4. **The Putrefaction Theory**. First announced by Pfaff (1756) who claimed that destruction of teeth by caries was due to putrefaction of remains of food upon them; approaches the truth but fails to recognize the agency of bacteria.
5. **The Chemical Theory**. Though suggested vaguely by several ancient writers, the chemical theory of dental caries is modern and was generally accepted up to the time of Miller's experiments published in 1882. According to this theory the destruction of teeth by caries was attributed to the solvent action of acids. Watts was the most conspicuous advocate of this theory. He held that three mineral acids, hydrochloric, sulphuric and nitric were the sole agencies of caries; the nitric acid producing the rapid white variety, the sulphuric the black and the hydrochloric the intermediate shades of caries.
6. **The Electro Chemical Theory**. Bridgman (1861-63) promulgated the theory that a tooth in a living body was always polarized, the root invested in the gum and alveolas being electro-positive, while

the crown exposed to the atmosphere was electro-negative, thus constituting a miniature galvanic battery the current thus set up decomposing the saliva holding in solution food particles, forming acids which attacked the tooth tissues. The electro chemical theory was adopted by what was known as the "New Departure Corps" and offered as an explanation of secondary caries about fillings. Through a long line of experiments to establish the position, in the electro-chemical series, of dentin with the various filling materials, it was shown that gold was the most incompatible with dentin, amalgam next, then tin, gutta percha and the oxide of zinc cements in the order named.

7. The Germ Theory... Though many earlier investigators foreshadowed in their writings the agency of germs in the production of caries of the teeth, it was not until this theory was positively demonstrated by Dr. W. D. Miller of Berlin that it was generally accepted as an established truth.

13 16 A tube containing a solution of starch was fastened to a molar tooth upon retiring. In the morning contents of tube strongly acid. A tube of starch solution with saliva added was incubated at blood temperature. After four or five hours the mixture became acid. The conclusion was that the acid was the result of fermentation produced by germs.

13 17 The starch was heated to 100°C., sufficient to destroy any germs present, saliva being added and the mixture kept in an incubator at blood heat, acid was produced. The saliva was boiled and upon repeating the experiment no acid resulted. The conclusion was that the germs resided in the saliva.

13 18 The germs were shown to be reproductive by inoculating a fresh culture medium from an infected tube when the germs were seen to rapidly multiply.

13 19 By chemical analysis the acid produced was shown to be lactic.

14 31 Micro-organisms which can only exist in the presence of oxygen are called "aerobic." Those cap-

able of existing without oxygen are called "anaerobic." Those which, in the normal state thrive in the presence of oxygen but which are capable under changed conditions of existing without oxygen, are said to be "facultative anaerobic."

- 15 40 The predisposing causes of caries.
1. Faulty formation. Those relating to external form; those relating to internal structure.
 2. Manner of approximal contact.
 3. Malposition.
 4. Heredity.
 5. Morbid condition of oral fluids.
 6. Sickness.
 7. Pregnancy.
 8. Artificial dentures.
 9. Lack of cleanliness.
 10. Lack of exercise.
- 15 41 Dr. Marshall enumerates as constitutional predisposing causes of caries:
1. Environment.
 2. Climatic influences.
 3. Miscegenation.
 4. Excessive mental strain in growing children.
 5. Hereditary influence.
 6. Influence of inherited disease.
 7. Exanthematous disease.
 8. Continued fevers.
- 18 15 Salicylic acid is an effective and safe antiseptic. What is known as Thiersch's antiseptic solution is composed of salicylic acid four parts; boric acid, twelve parts; water, one thousand parts. Flavor to suit the taste with oil of cassia, peppermint or wintergreen.
- 18 24 The Stopping Process may be defined as any method of treatment of dental caries which effects the removal of the carious matter and substitutes therefor some material possessing such inherent physical properties as render it capable of introduction into all parts of the resultant cavity and of protecting its margins and inner surface from further destructive influences.
- Dr. Louis Jack in American System of Dentistry.

- 19 36 Dr. Louis Jack in The American System of Dentistry says that to be a skillful operator "involves a knowledge of the chemical and physical properties of (filling) materials, a general knowledge of physics, a correct eye for good forms, a clear judgment, and, moreover, a sensitive and well trained hand."
- 25 12 Dr. G. V. Black has arranged cavities in groups according to similarity of treatment in preparation for convenience of study. His arrangement is in five groups or classes. The sixth I have added.
- Class 1. Cavities beginning in structural defects in the teeth, as pits and fissures.
- Class 2. Cavities in the gingival third—not pit cavities—of the labial, buccal or lingual surfaces of the teeth.
- Class 3. Cavities in the proximate surfaces of the incisors and cuspids which do not involve the removal and restoration of the mesial or distal angle.
- Class 4. Cavities in the proximate surfaces of the incisors and cuspids which do require the removal and restoration of the mesial or distal angle.
- Class 5. Cavities in the proximate surfaces of the bicuspid and molars.
- Class 6. Abraded surfaces.
- 25 13 Cavities are also divided into two great groups, pit and fissure cavities and abraded surface cavities forming one group, and classes 2, 3, 4 and 5 forming another group of cavities upon smooth surfaces habitually unclean.
- 26 17 The four steps in cavity preparation are as follows:
1. Gaining access.
 2. Removal of soft carious matter.
 3. Obtaining retention and resistance forms.
 4. Cavity toilet, and management of enamel margins.
- 26 22 Dr. Black's rules for preparation of enamel margins as arranged by Dr. W. E. Grant are as follows:
- Rule 1. Extend the cavity margins in every direction until sound enamel is reached.

- Rule 2. If necessary, further extension should be made until full length enamel rods supported by dentin are reached.
- Rule 3. Cut away the enamel until the surface of the filling can be so formed that the enamel margin will be self-cleansing or be protected by the gum margin.
- Rule 4. Do not form an enamel margin in such a position as to leave a small portion of enamel between it and one of the developmental grooves.
- Rule 5. A fissure, sulcate or angular developmental groove should be cut in its entire length and included in the cavity.
- Rule 6. The line of the enamel margins should be in definite curves or straight lines, avoiding all angles.
- Rule 7. The labial, buccal, and lingual margins should be parallel to each other and at right angles to the seat of the cavity.
- Rule 8. All margins should be cut smooth, and after applying the above rules, should be beveled in such a manner as to leave the marginal edges slightly obtuse.
- 26 32 By the term "crushing strain" is meant the force of mastication brought directly upon the exposed surface of the filling and through it to the seat of the cavity.
- 26 33 In occlusal cavities the pulpal wall constitutes the "seat." In proximate cavities the gingival wall and in case of complex cavities with occlusal or incisal step, the gingival wall plus the step constitute the seat.
- 26 34 An extension from an axial cavity upon the incisal or occlusal surface for the purpose of gaining resistance form is called the "step" of such cavity.
- 26 35 The seat must be flat and at right angles to the long axis of the tooth and direction of the strain.
- 26 36 By the term "extension for prevention" is meant the extending of cavity margins, upon smooth, unclean surfaces, from an area of great liability to caries to an area of lesser liability.

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26	37	"Affected dentin" is dentin which has been acted upon by the lactic acid in advance of the micro-organisms of caries.
26	38	"Infected dentin" is dentin which has been penetrated by the micro-organisms of caries.
27	39	The four varieties of carious matter are: 1. Horn-like, occurring at the necks of teeth. 2. Leathery, found usually in young teeth. 3. Soft or cheese-like, a light colored variety of rapid progress. 4. Dry or hard, dark in color and of slow progress, sometimes spontaneously arrested.
27	46	Rule 1. When the depth of cavity is equal to or greater than the width, parallel walls are sufficient for retention in cavities of class one, and class two. Rule 2. When width of cavity is greater than the depth some undercutting is necessary.
28	60	By Convenience Form is meant such shaping of the cavity outline as will render the form more convenient for packing the filling material, or the placing of slight undercuts or angles in the cavity walls as starting points for the filling. —Black.
30	87	A good rule as to the extent of the extension (for prevention, in cavities of class 5) is to cut the lingual wall to a line where its margin will be in view, past the proximating tooth when looking across the central incisors at the median line, and make the extension of the buccal wall to correspond. —Black. The above applies to a mesial cavity in an upper first molar and will serve as a guide as to extension in other cavities of this class.
32	1	The four general objects in view in filling carious teeth are: 1. To arrest existing decay. 2. To preserve from future attacks of caries. 3. To provide against stress of mastication. 4. To restore full form of tooth.
32	2	The points to be taken into consideration in the selection of a filling material are: The age of

- the patient, the sex, condition of health, character of the teeth and the oral secretions, the evident care bestowed upon the teeth, and the life expectancy of the individual or of the tooth.
- 33 11 Fillings may be said to preserve teeth in one of four ways.
1. By perfect exclusion of the oral fluids.
 2. By deposit of metallic salts.
 3. By therapeutic or medicinal effects.
 4. By non-conduction and non-irritation.
- 33 14 Dr. C. N. Johnson has pointed out that gold is much less objectionable in color when exposed to view in the anterior teeth, in the mouths of some individuals than in others. He says: "It will be found that decided blondes will tolerate gold in their anterior teeth with less objection than will brunettes. In fact, the color of gold harmonizes so well with the former that if a filling is well inserted there is nothing to offend the eye at a distance of several feet. On the other hand, a gold filling in the mouth of a brunette becomes at once conspicuous and objectionable."
- 33 19 Dr. Arthur in 1855 accidentally discovered the cohesive property of pure gold and at once began to experiment with it and devised means to regulate and make intelligent use of it.
- 34 32 Annealing gold makes it cohesive by driving off from its surface any volatile or combustible impurity and probably also by a rearrangement of its molecules by the heat.
- 34 33 Gold may be rendered permanently non-cohesive by depositing upon its surface some substance which cannot be volatilized or burned off. It is well known that Abbey's foil cannot be made cohesive by annealing, the impurity upon its surface being non-volatile; probably some form of iron.
- 34 34 The Sulphur and Phosphorus groups, as pointed out by Dr. Black, are especially injurious to gold.
- 34 35 These gases are present in the atmosphere especially in winter, and also many reach the gold from the use of sulphur matches.

- 34 36 Dr. Black advises that, since acid gases are found to be most likely to permanently destroy the cohesive property of gold, the gold should be kept in an atmosphere containing a liberal per cent of ammonia, which by forming ammonium salts on the gold surface will protect it from acid gases. The ammonium salts being readily volatilized by heat, the gold may at any time be made cohesive by annealing. For this purpose an open bottle of salts of ammonia should be kept in the drawer containing the gold.
- 34 42 The retention of gold in a cavity depends upon the retentive form of the cavity and the proper arrangement or packing of the gold into the cavity.
- 34 43 The three methods of packing gold into a cavity are:
1. By mechanical arrangement, employed when using non-cohesive gold.
 2. By incorporation, employed when cohesive and non-cohesive gold are used in combination.
 3. By cohesion, employed when cohesive gold alone is used.
- Dr. Louis Jack, American System of Dentistry.
- 34 45 The resistances to be overcome in packing gold into a cavity are:
1. Natural rigidity of the gold.
 2. Confinement of air particles in the folds or meshes of gold.
 3. Friction of one piece of gold upon another and upon the cavity walls.
 4. The crimpling of the gold.
- Dr. Louis Jack in American System.
- 34 46 The forces applied to overcome these resistances are:
1. Direct pressure.
 2. Wedging.
 3. Leverage.
 4. Percussion.
- Dr. Louis Jack.
- 35 53 The three objects to be borne in mind in packing gold into a cavity are:.
1. Adaptation to cavity walls and margins.

2. Form of external surface.
3. Density of the mass.

—Dr. Louis Jack.

- 36 63 The impacting power of a plugger point under a given amount of force is in indirect ratio to the size of the plugger point. That is, the smaller the plugger point the greater its impacting power under the same applied force. The area of a plugger point is practically the square of its diameter. A reduction of the size of a plugger point below say, one millimeter, increases the condensing power of the impact in proportion to the square of the reduced area and increasing the size of the point above one millimeter diminishes the condensing power of the impact in proportion to the square of the increased diameter.
- To make solid fillings therefore, small condensing points, not more than one square millimeter in area, should be used.

Dr. G. V. Black.

- 37 91 About the year 1826 M. Teveau of Paris introduced what he called "silver paste," consisting of pure silver and mercury.
- 37 92 Amalgam was introduced into this country in 1833 by the Crawcour brothers under the name "Royal Mineral Succedaneum."

—American System of Dentistry, Vol. II.

- 37 97 The physical properties of amalgam are:
1. That of hardening.
 2. Expansion and contraction.
 3. Flow.
 4. Edge strength.
 5. Color.
- 38 100 Dr. Black has shown that contraction and expansion are influenced by
1. The composition of the alloy.
 2. The fineness of the cut of the alloy.
 3. The amount of mercury used in amalgamation.
 4. The evenness with which the mercury is distributed.
 5. The method of manipulation.

- 38 102 Dr. Black was the first to observe and to call attention to the tendency of amalgams to flow or flatten under stress. Most metals, as was well known, will yield to a given pressure up to a certain point and then cease, beginning again to yield when pressure is increased and again ceasing. Amalgams, on the contrary, continue to yield as long as pressure is continued even though it be not increased. There is manifest a disposition of the material to creep out from under a load. This fact explains the bulging of amalgam fillings when exposed to occlusal stress, a portion of the filling being unconfined upon an axial surface; a phenomenon often observed in the mouth.
- 38 106 In the course of his experiments Dr. Black observed that the age of cut alloys had a marked influence upon the physical properties of their amalgams, especially those of expansion and contraction. By annealing freshly cut alloys, thus producing an artificial ageing, they were brought into a state of stability so that their amalgams always showed uniform and constant properties.
- 38 107 Annealing of alloys is accomplished by subjecting them, when freshly cut, to either dry or moist heat ranging from 110° to 212°F. and continued for some hours. The lower temperatures produced the best results.
- 38 108. Annealing of alloys has the effect of increasing the contraction, flow and edge strength or crushing strain of the amalgam, they require less mercury for amalgamation and the amalgam sets slower.
- 38 112 According to Dr. Black the effect of modifying the silver-tin alloy with the addition of 5 per cent of some other metals is, in part, as follows:
- Gold added 5 per cent. Slows setting.
Flows more.
Takes less mercury.
Crushing stress increased.
Shrinkage reduced.
- Platinum added 5 per cent. Darkens.
Slows setting considerably.
Flows badly.
Shrinkage — expansion range increased.

Copper added 5 per cent. Sets quickly.

Annealed sets slower.

Expansion increased.

Flow diminished.

Crushing stress greatest of all.

Zinc added 5 per cent. Great expansion, very slow
but long continued.

Apparent adhesion to walls.

Sets quicker—less when an-
nealed.

Flow decidedly increased.

Color improved.

Crushing strength increased.

Takes more mercury.

—Dr. G. V. Black, Cosmos 1896, p. 988.

39 116 Dr. Black found the following formula to give the
most successful results:

Ag. 68.5, Sn. 25.5, Au. 5. Zn. 1, or, substituting cop-
per for the gold, Ag. 68. Sn. 26. Au 5. Zn. 1.

46 93 The symptoms accompanying inflammation of the
peridental membrane are:

1. Tenderness upon percussion.
2. Dull percussion note.
3. Protrusion and looseness of tooth.
5. Heightened gum color.

THE HOLLOW GOLD INLAY—DESCRIPTION IN DETAIL OF ITS CONSTRUCTION.

The gold inlay is chiefly applicable to large cavities in molars and bicuspid, though it may occasionally be employed to advantage in other localities. In small and medium sized cavities on the occlusal or axio-occlusal surfaces which may be readily filled in the ordinary way, the gold inlay is not indicated. In medium sized cavities, however, the determination of choice of inlay or filling would be governed by the character of the tooth tissues, the sensitiveness of the periodontal membrane to percussion, and the physical condition of the patient. In very large complex cavities, the extent to which restoration may be attempted and successfully accomplished by means of a gold inlay is almost unlimited. Almost the entire crown may frequently be thus rebuilt to better advantage, the health and comfort of the adjacent tissues considered, than by means of a banded crown. The term "inlay" however, demands that there must be enough of the natural crown remaining to receive within a cavity formed in its substance, the prosthetic device employed to restore the lost portion. The class of cavities most frequently selected for gold inlays are those complex cavities involving one or more axial surfaces and the occlusal. For the purpose of description we will select a cavity involving the entire mesial surface of a lower first molar, the buccal and lingual walls denuded of dentin and quite frail and the occlusal wall broken in. The first step is to boldly cut away the buccal and lingual walls with a chisel. Here we practice extension for prevention heroically and are not deterred in so doing by the thought of the labor it will involve to restore the contour by the tedious malleting of cohesive gold. With

a gold inlay it is as easy to restore a large contour as a small one. So we cut these walls back until they lie in sound tissue and until all over-hang so far as is possible, has been removed. The margins should be cut in straight lines and carefully smoothed and bevelled. The step on the occlusal surface must include all developmental grooves, must be made flat and with surrounding walls perpendicular to the floor or leaning slightly away from the perpendicular and without undercuts. If following the natural lines of fissured grooves does not give the step the general effect of a dove tail, such form must be given to it by broadening the step towards the distal extremity. It is important that an inlay shall be retained against mastication stress by the shape of the cavity alone, the cement serving the purposes only of hermetically sealing the cavity and holding the inlay from falling out or being lifted out occlusally the way it was put in.

The cavity must now be viewed carefully by direct vision and by reflection in a plane mouth mirror so as to be able to look squarely down into it to determine if all undercuts have been eliminated. If there are any undercuts which cannot be eliminated without too much destruction of tooth tissue they may be filled with cement which is to be removed again just previous to setting the finished inlay that the fresh cement may secure the additional grasp upon the tooth that such undercuts afford. If there should be any doubt as to the cavity having been given the proper form to "draw" freely, that point may be determined by pressing into the moist cavity a piece of softened modeling compound which is chilled and upon withdrawing will show just where further trimming is needed. A piece of pure gold plate 36-gauge or thinner is cut of such size as to be ample for the purpose but not so bulky as to be in the way; one edge is trimmed to a curve like the edge of a matrix band and this edge is slipped down below the gum margin at the gingival cavity wall and being held with one hand the gold is forced into the cavity and against the axial wall preferably with a pair of ball pointed

pliers shaped like foil carriers, and a pledget of wet cotton or punk. The gold is now adapted to the axial portion of the cavity with suitable burnishers, one being used in the left hand as an assistant to hold the piece firm while being manipulated by the one in the other hand. As soon as the gold begins to harden and grow springy under the burnishing, it should be removed and annealed by heating to redness, and this must be done frequently while adapting this, the matrix piece. When the matrix has been fairly well adapted to the axial portion of the cavity, wet cotton is packed tightly into that part of the cavity and against the approximating tooth, thus holding the gold immovable while the occlusal portion is carefully carried over and adapted to floor and walls of the step. The adjustment to the floor of the step should be completed with a circular flat ended burnisher like an inverted cone bur of a size suited to the size of the fissures and the gold carried into every part of the step. In narrow deep fissures the gold will probably be punctured in which case and when not punctured as well, crystal gold should be packed tightly into these fissures, the cotton removed from the axial portion, the matrix skillfully teased up and lifted out and some 22-karat gold melted with a blow-pipe into the crystal gold. When replaced in the cavity this stiffened step holds firmly to its place while the axial portion is accurately adapted and all margins smoothed nicely over with a flat slender burnisher. The matrix is again removed and trimmed with curved shears following the outline of the cavity and leaving an overlap all around about one millimeter in width. This excess of gold around the margins is important as will be seen later. A small hole is now punched with a plate punch in the center of the axial portion of the matrix which is again placed in the cavity and any distortion corrected.

The next step, the arrangement of the outer piece of gold and the formation of the contour, appears at first sight to be quite difficult, but in most cases it is very simple. A piece of the same thickness of pure gold is cut, large enough to

extend well out into the embrassures, buccal and lingual, and to reach over upon the occlusal as far as will be needed. This is trimmed along one edge to fit within the line on the matrix piece which marks the gingival margin, but is not allowed to lap over upon the excess left along that margin. The two pieces are now held together with a pair of long, slender solder tweezers in such manner that the edge of the outside piece is kept in contact with the line of the gingival margin and is there tacked with a tiny piece of 22-karat gold. Thus is formed in effect, a hinge, and gives a fixed point as a base from which to develop the desired contour. The pieces thus assembled are replaced in the cavity and pledgets of wet cotton are packed between them forcing the outer piece of gold out to the desired contact with the approximating tooth. The gold is then bent over upon the occlusal surface, smoothed down somewhat with an egg shaped burnisher and the patient instructed to close tightly upon it thus forcing the thin gold into proper articulating form. The piece is now removed and with a pair of small, pointed, curved shears the bucco—and linguo—occlusal angles are slit far enough to permit of proper shaping of those corners, and the outer piece trimmed all around so that its margin falls within the excess provided on the matrix piece, and as nearly as possible along the true margin of the cavity clearly shown on the matrix. This arrangement makes the placing of the solder easier and provides an overlap of thin pure gold for final burnishing when the inlay is set.

The piece is again returned to the cavity and the margins carefully smoothed down to contact and the slit corners so manipulated as to properly form the bucco—and lingo—occlusal angles. It is now removed, opened by bending the outer piece back upon the hinge at the gingival margin, the cotton removed, the parts brought back into position again and being grasped with the long tweezers at the disto-occlusal extremity, the margins are soldered with a blow-pipe using small pieces of 22-karat plate for the purpose. It may now be tried in the cavity again to see that everything is as it

is desired it should be. Any irregularities caused by the gold crimping may be smoothed up perfectly or any desired additions to the outside can be now made by fusing pieces of 22-karat plate upon such places with a mouth blow-pipe. With curved shears the little punch hole in the matrix piece is cut to a circular or oblong hole about 1-8 inch in diameter, and through this hole pieces of 22-karat or 20-karat solder are dropped, a little powdered borax put in, being careful that no borax is left on the outside of matrix, and the solder fused by holding in the flame of a Bunsen burner, so directing the flow of the fused metal by gravity that the step is filled first. This is repeated until the space within is almost but not quite full, a cavity being left just within and about the hole for the cement to enter and help hold the inlay in place when set. This opening being opposite to the point of nearest approach to the pulp of a vital tooth will afford an appreciable protection to that organ from thermal shocks. After the last fusing the piece should be dropped hot into a 50 per cent solution of sulphuric acid to remove all borax.

The approximal surface of the inlay is filed smooth and polished before setting so that that surface need not be touched afterwards.

The cavity and the inlay are thoroughly dried with alcohol and warm air, cement mixed to a thick cream is worked deftly into the hole in the inlay from one side so as to expel the air, the matrix is covered over with the cement and the inlay inserted into the tooth cavity, pushed firmly to place and while held under pressure with a convex faced burnisher the overlapping margins are burnished close to the tooth all around. When the cement has hardened the occlusal portion is finished just as a gold filling would be, and the buccal and lingual margins appearing in the embrassures are polished with fine sand paper or cuttle bone disks.

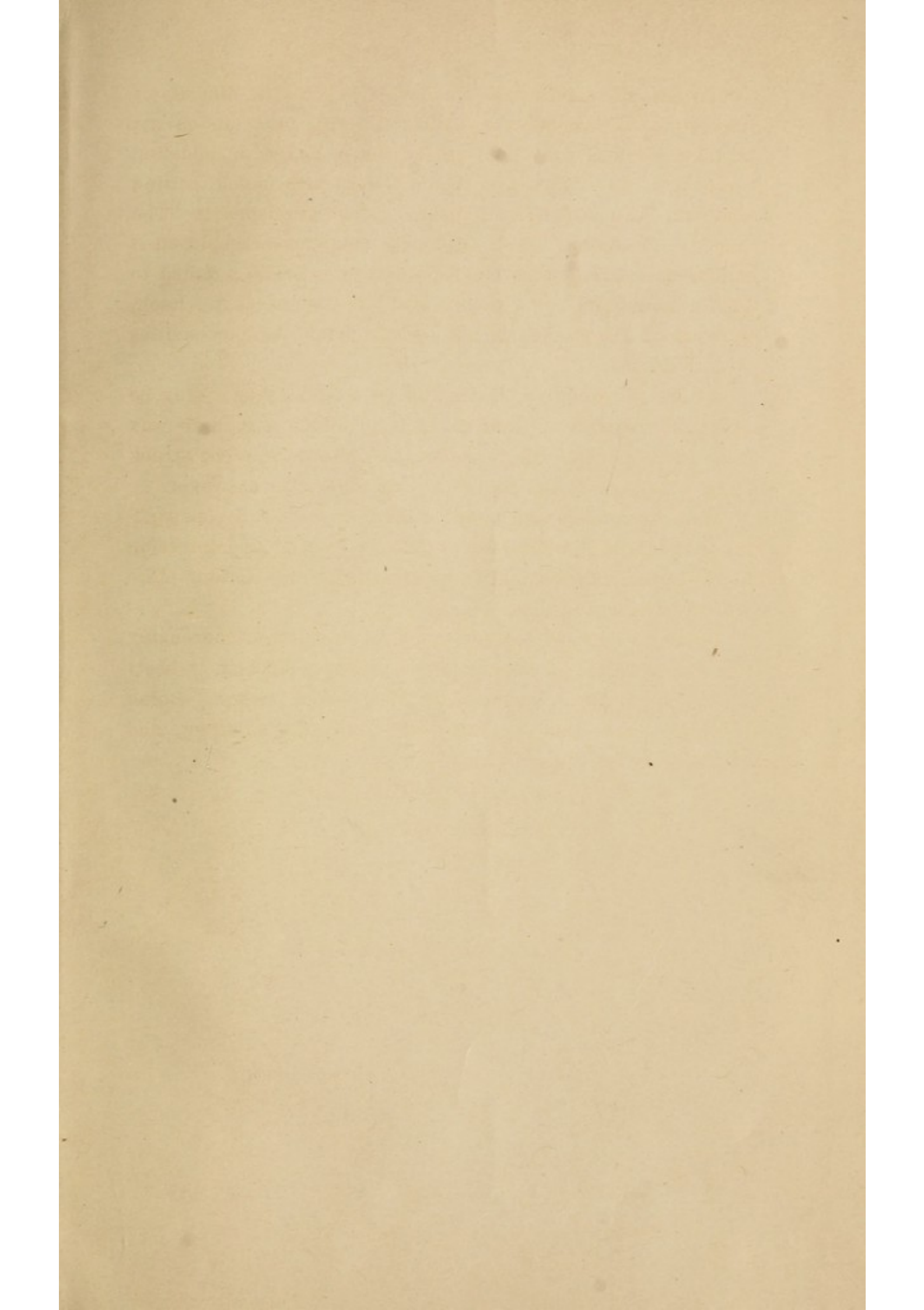
If the inlay has been properly made and set there is no where to be seen any cement, the overlapping edge of pure gold affording perfect protection against any possibility of cement being dissolved out.

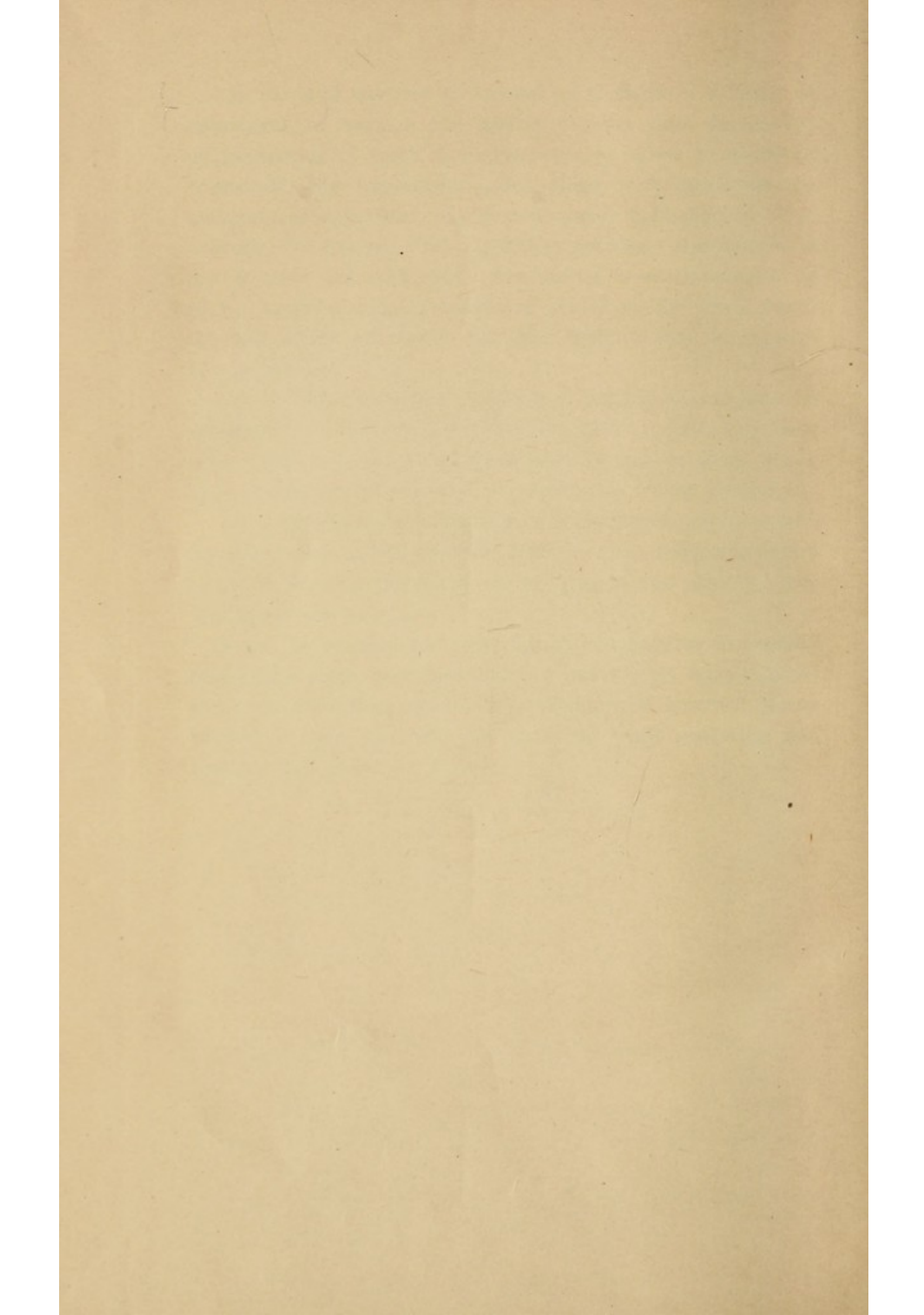
In cases of cavities so located as to make it difficult or impossible to burnish the matrix directly into the cavity, an impression of tooth and cavity can be taken in modeling compound, the impression being filled with quick setting amalgam as described in a former paper published in "The Cosmos" for August, 1902. If copper amalgam is employed it can be used over and over. The matrix is easily adapted to such a model and being readily corrected in the cavity itself, the rest of the process is not more difficult than in cavities of easy access.

Where the contour restoration is considerable it may be advisable to build out and carve the contour with hard wax from which a metal die is made and the outside piece struck up in a Ransom & Randolph or some other crown swager.

With experience and practice in this method of constructing gold inlays, it will be found that the need of an impression to aid in forming the matrix or of swaging the contour piece will grow less and less.

Borax to be used for soldering should be first thoroughly fused on a thick porcelain dish, (a heavy soap dish is best) and then ground to powder in a Wedgewood mortar. Borax treated in this way will not swell up while soldering and displace the pieces of solder.







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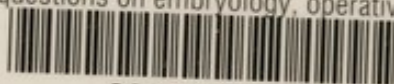
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