

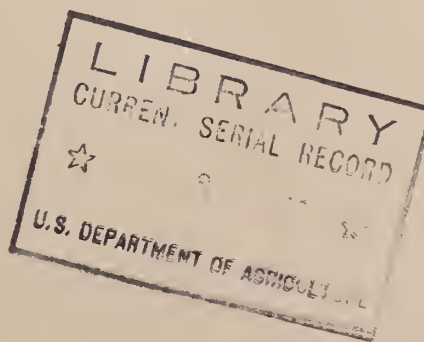
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GUIDE TO THE LITERATURE ON COLLAGEN *

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CONTENTS

	<i>PAGE</i>
Introduction	<i>i</i>
Acknowledgements	<i>ii</i>
Sources Consulted.	<i>ii</i>
Note on the classification of references	<i>iii</i>
Citations --	
Section I. Biology	<i>1</i>
A. Histogenesis, Tissue Culture, Wound Healing.	<i>1</i>
B. Histology and Histological Technique	<i>5</i>
C. Physiology and Pathology	<i>11</i>
D. Connective tissue, Elastin and Reticulin	<i>16</i>
Section II. Biophysics	<i>21</i>
Section III. Chemistry	<i>29</i>
A. Sources and determination.	<i>29</i>
B. Preparation and general chemical properties.	<i>52</i>
C. Amino acid composition and determination	<i>56</i>
D. Reactions with acids, alkalies and salts	<i>59</i>
E. Reactions with enzymes	<i>45</i>
F. Reactions with tanning agents.	<i>51</i>
G. Physical chemistry and physics	<i>56</i>
H. Leather, Technology, Industrial applications and Products. .	<i>67</i>
I. Patents.	<i>74</i>
J. Gelatin.	<i>76</i>
K. Elastin and Reticulin.	<i>82</i>
L. Proteins and topics related to collagen study.	<i>88</i>
Section IV. Supplementary list of references (1947 to September 1949)	<i>92</i>
Author Index	<i>103</i>
Subject Index.	<i>119</i>

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INTRODUCTION

The term collagen refers to a chemical substance of animal origin. Biologically, collagen is recognized by its preferential staining reactions. The biophysicist recognizes collagen by its x-ray diffraction pattern, and appearance in the electron microscope. Collagen is a natural fibrous high polymer possessing little elasticity but great mechanical strength.

To the chemist, collagen is a simple albuminoid protein, which is, at ordinary temperatures insoluble in water, dilute acids and alkalies, and solutions of salts such as sodium chloride and ammonium sulfate. In its native state collagen is resistant to digestion by certain proteolytic enzymes. Collagen has physico-chemical properties which set it apart from other proteins. These are its characteristic iso-electric point, the property of birefringence, and swelling reactions in acids, alkalis and solutions of certain salts such as barium chloride and calcium chloride. When heated gradually in water, collagen shrinks within a small but well-defined temperature range.

When boiled in water for a sufficiently long time, collagen is irreversibly changed into gelatin, a water soluble protein, having many physical and chemical properties (other than solubility in water) markedly different from its forerunner collagen. Much of our knowledge of the chemistry of collagen, in particular, and proteins in general, has been derived from investigations on gelatin.

Bracconot's discovery of glycine in a gelatin hydrolysate (1820) [749], and Graham's [763] investigations on the diffusion of gelatin solutions (1861-1865) mark the beginning of protein and colloid chemistry, respectively.

A greatly enriched knowledge and understanding of the gross and microscopic anatomy of animal tissues and organs is the result of many studies made on collagenous tissues by investigators since Malpighi founded the science of histology. This is not surprising since collagen is so widely distributed throughout the animal kingdom, and is found in varying amounts in all vertebrate animal tissues and organs.

The leather technologist is concerned with the chemical, mechanical and physical properties of collagen, so that he can modify and control the many processing steps involved in leather manufacture to improve processing efficiency and to obtain desired qualities in the finished leather.

This bibliography was started as an aid in planning and executing experiments, to elucidate the fundamental physical and chemical properties of collagen, so essential for a better understanding of the tanning mechanism, and improvement of tanning practice. The large number of references obtained, and the varied fields of scientific investigation covered by these references, suggested that a bibliography on collagen would be of value to many workers in biological, biophysical, chemical and physical research.

Limiting the references to collagen alone was found to be impossible since the terms gelatin, glue, skin, hide substance, hide powder, connective tissue, tendon and others are very frequently though erroneously used as synonyms for collagen. This is a fortuitous circumstance, since much of our knowledge concerning collagen is based on investigations of the various collagenic derivatives or tissues listed. The strictly non-collagen references have been kept to a minimum as a necessity but it is hoped there are enough such citations to be of use to investigators whether their interests are biological, chemical or technological.

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Chemical Society London Journal Abstracts	1878-1925
Index Medicus	1879-1926
Surgeon General's Catalog	Ser. 1-4; 1880-1938
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Card file of references

J. H. Highberger - United Shoe Machinery Company

NOTE ON THE CLASSIFICATION OF REFERENCES

References in this bibliography are grouped into four sections. Section I, Biology references, is classified under four headings, and Section III, chemistry references, are classified under twelve headings. Section IV is a supplementary list of references which were obtained from a search of Chemical Abstracts, Biological Abstracts, the Journal of the American Leather Chemists Association, the Journal of the International Society of Leather Trades Chemists, published from January 1947 through August 1949. The citations are arranged alphabetically and chronologically according to author within each classification group. More detailed classification of the references will be found in the subject index, which was made as comprehensive as possible so as to make the bibliography independent of the classification system adopted as a matter of convenience to the author. Each citation was verified by consulting the original source whenever possible. Chemisches Zentralblatt, Chemical Abstracts, Biological Abstracts, and other secondary sources were consulted only when the original source was not available in the libraries of the Philadelphia area. Insofar as possible abbreviations used are those in the United States Department of Agriculture Miscellaneous Publication 334, "Abbreviations used in the Department of Agriculture for Titles and Publications".

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SECTION IV. SUPPLEMENTARY

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AUTHOR INDEX

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Abell, R. G.	1	Atkin, W. R.	217,377,552,893
Abercrombie, M.	106,891	Attari, H.	727
Abitz, W.	248,761	Axelrod, D. J.	894,895
Abramson, H. A.	544		
Ackermann, W.	433,488	Babakina, V. G.	645
Adams, R. S.	423,524,525,554	Bach, S.	566,760
Adova, A. N.	482,483,484	Baehr, G.	120,121,896
Aggeew, N.	611	Baitsell, G. A.	3
Alburn, H. E.	281	Baker, R.	953
Alexander, J.	739,807,808	Baldracco, F.	381,382,383,384,385
Alfejew, S.	2	Baldwin, E.	309
Alge, A.	578	Balfe, M. P.	897
Almquist, H. J.	282	Bares, J.	434
American Leather Chemists' Association	545	Bass, H. T.	285
Ames, W. M.	740,741,742	Bastian, A.	354
Amprinc, R.	156	Bate Smith, E. C. see Smith, E. C. Bate	
Anderson, H. V.	228	Baudoy, C.	112
Andrew, R. H.	439	Bauer, W.	143
Anon.	546	Baylor, M. B.	235
Arbusov, D.	873	Bear, A. W.	542
Arbuzov, G. A.	522,547,644	Bear, R. S.	223,224,225
Astbury, W. T.	204,205,206,207, 208,209,210,211, 212,213,214,215, 216,217,218,219, 220,221,222,892	Bechhold, H.	743
Ash, J. E.	55	Beek, J., Jr.	305,306,307, 308,378,548
		Bell, D. J.	309

<u>Author</u>	<u>Reference</u>
Bell, E. F.	283
Bell, E. L.	285
Bell, F. O.	218
Bennett, H. B.	549, 550, 551
Bennett, H. G.	744
Benninghoff, A.	157
Bensley, S. H.	158
Bentley, F. H.	4
Berg, J. L.	898
Berger, E. E. F.	713
Bergmann, M.	310, 311, 355, 371, 435, 436, 714, 745, 746, 809
Beveridge, J. M. R.	356
Berlin, M. I.	603
Berrâr, M.	747
Bezler, F. I.	379
Bidder, P. B.	838
Bidwell, E.	899
Biedermann, R.	409
Bierich, R.	107
Bincer, H.	754
Blackburn, S.	380
Blechman, H.	79
Block, R. J.	357, 810, 811, 812
Blockey, J. R.	494
Bloom, W.	78
Blum, A. E.	950, 951
Blum, W. A.	621

<u>Author</u>	<u>Reference</u>
Blumgart, H. L.	284
Boensel, H.	771
Bogue, R. H.	312, 748
Bolling, D.	357, 810, 812
Borasky, R.	975
Botvinik, M. M.	358, 393
Boulanger, H.	646
Bourne, G.	5
Bowes, J. H.	495, 496, 497, 498, 900, 901, 902, 903, 904, 905
Braconnot, H.	749
Brand, F. C.	812
Brave, G. A.	381, 382, 383, 384, 385
Braybrooks, W. E.	313, 552, 647
Briggs, P. S.	648
Brown, A.	788
Brown, J. D.	287
Brush, B. E.	911
Bucheimer, K.	339
Bucher, R.	108
Buchkovskii, M. V.	260
Buenger, L.	314
Bulankin, I. N.	553
Bull, H. B.	813
Burns, E. L.	124
Burton, D.	893
Bussino, G.	531
Buzâgh, A.	649, 650

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Cameron, D. H.	523,524,525,554,969	Cohn, E. J.	750
Campbell, C. H.	715,716	Colin-Russ, A.	663
Carreggio, L.	698	Collin, R.	56,57,751
Carrel, A.	6	Compton, L. D.	908
Casaburi, J.	651,652	Conabere, G. O.	58
Cassel, J. M.	906,907	Conn, H. J.	59
Chambard, P.	315,343,344,345, 386,653,654,655	Consden, R.	909
Champetier, G.	226,227,242	Coolidge, T. B.	964
Chan, Eugene	295	Coombs, F. A.	664
Chang, P. C.	387	Copeland, D. E.	60
Chang-Tai Yen	387	Copley, M. J.	858
Charlwood, P. A.	899	Corey, R. B.	238,280
Chater, W. J.	656,657,658, 659,660,661	Corner, G. W.	159
Cherbuliez, E.	316,317,555	Corrodini, C.	651,652
Chernov, N. V.	318,556	Cosslett, V. E.	910
Cheshire, A.	662	Cotton-Feytis, E.	814
Chesley, K. G.	228	Cover, S.	285
Chibnall, A. C.	359	Cowley, L. L.	911
Chlopin, N. G.	7	Cresswell, A.	912,913
Clark, E. R.	1,8,9	Cross, C. F.	665
Clark, G. L.	229,230,231,232, 233,234,235,236	Dakin, H. D.	752
Clark, J. H.	237,557	Dalton, A. J.	987
Claude, A.	269	Dann, L.	10
Cobb, R. M.	499	Darrow, M. A.	59
Cockbain, E. G.	558	Davies, A.	717,718,719, 720,721
		Davis, S.	914

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Day, T. D.	915, 916, 917, 918, 919	Elder, F. R.	110
DeForge, A.	286, 319, 320, 388, 437, 438, 559, 560, 666	Ellison, H. L.	969
DeLore, J.	815	Elöd, E.	321, 389
Demin, V. S.	667	Elvehjem, C. A.	930, 947
Dempsey, M.	844, 920	Emmett, A. D.	322
Derksen, J. C.	160, 816	Engel, O.	456
Dewsbury, W. G.	717, 718, 719, 720, 721	Espin, J.	111
Dietsche, O.	452, 453, 454	Esterly, A. R.	704
Doehner, K.	410	Ettisch, G.	163
Dohogne, A.	61	Evans, D. E.	470
Dolfini, G.	109	Ewald, A.	501, 561
Doijanski, L.	161, 162	Fabrion.....	669
Dorman, A.	283	Faure ^o -Premiet, E. ..	112, 226, 227, 323, 797, 798, 799, 800, 801, 814
Doubrow, S.	142	Feitelberg, S.	923
Dribben, I. S.	921	Fel'dman, R. I.	429, 556, 562, 563, 616
Dröschner, K. Th.	772, 773	Fenger, F.	439
Düggeli, O.	11	Fenn, W. O.	756
Duke, K. L.	922	Feriz, H.	113, 668
Dulitskaya, R. A.	500, 753	Ferri, C.	265
Duplant, F.	62	Ferroir, J.	142
Ebeling, A. H.	6	Fiessinger, N.	114
Edsall, J. T.	750	Findlay, J. D.	924
Eggert, J.	754, 755	Fischer, M.	324
Eichelberger, L.	287, 288	Fleischmann, K.	722
Eisele, W.	288	Fleming, J. W.	464, 465

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Fleming, W.	164	Gerngross, I.	240,241,248,257, 360,566,579,671, 759,760,761
Florence, G.	332	Gessler, A. E.	926,927
Florin, O.	494	Ghiron, V.	13
Fokina, N. see Fokina, N. S.		Gies, W. J.	110,188,202,314, 322,341,490
Fokina, N. S.	260,390-92,440,564	Gillette, E. P.	166
Foot, N. C.	165	Gilligan, D. R.	284,297
Forbes, J. C.	441	Gilman, J. A.	605
Foster, S. B.	430,431,628	Ginoza, Y. W.	869
Francois-Frank, L.	63,87	Ginzburg, E. I.	528
Frankel, M.	757,758	Giroud, A.	242
Franklin, K. J.	64	Glücksmann, A.	10
Freudenberg, Carl.....	723,724	Goetz, A. W.	706
Frey-Wyssling, A.	239,925	Gonnell, H. W.	249,574,575
Frohlich, H. G.	530	Gordon, A. H.	762,817,818
Fullam, E. F.	269	Gorin, M. H.	544
Gaillard, P. J.	43	Gorrod, M. E.	920
Gallun, A. F.	712	Gould, B. S.	967
Galy, P.	88	Graham, C. E.	928
Gamble, C. W.	565	Graham, T.	763
Ganz, J.	538,705	Grassmann, W.	326,327,328,329,330, 445,446,819,820
Garnot, R.	386	Green, R. W.	672,929
Garrod, M.	839,844,966	Greenberg, D. M.	821
Gavrilov, N. I.	325,393,442,443,670	Greenhut, I. T.	930
Gaza, W. von.	12		
Génin, G.	444		

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Greenwood, C. V.	665	Harper, F. R.	115
Greifenhagen, W.	764	Harris, M.	361,364,370
Grettie, D. P.	725	Harrison, W.	824,825
Grey, C. E.	926,927	Hartley, L. M.	948
Gross, J.	931,932,933,989	Hass, G.	15,16
Grynfelt, E.	14	Hausam, W.	399
Gustavson, K. H. ...	331,394,395,396,397, 502,503,504,505,506, 507,508,509,510,511, 567,568,673,674,822, 823,934,935,936,937, 938,939,940,941,942, 943,944,945,946	Hayashi, S.	116
Guyon, L.	63,85,87,183, 398,576,802	Henderson, L. M.	947
Haggqvist, G.	243	Henny, G. C.	992
Haines, W. T.	298	Herfeld, H.	360
Hájek, A.	805	Heringa, G. C.	17,18,65,160,167, 168,169,170,171, 245,246,247,570, 571,572,573,816
Hale, C. W.	462	Hermans, P. H.	826
Hall, C. E.	244,274,275	Herringa, G. C. - see Heringa, G. C.	
Hall, J. L.	289,948	Herrmann, K.	248,761
Halla, F.	569	Hertzler, A. E.	117
Hallberg, J.	512	Herzog, R. O.	249,250,574,827,828
Halwer, M.	858	Heston, W.	987
Hamalainen, C.	285	Hett, O.	150
Hamilton, J. G.	895	Heyminger, W. E. van.	474
Hamilton, T. S.	298,299	Hier, S. W.	928
Hankes, L. V.	947	Highberger, J. H.	251,252,333,362, 363,400,401,513, 514,529,577,675, 676,700,726,949
Hara, H.	290,291		

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Hiller, A.	376	Jalowy, B.	66
Hobbs, R. B.	677	Jamet, A.	345
Höber, R.	829	Jancke, W.	250, 575
Hobson, R. P.	447	Janicki, J.	330, 446
Hofmeister, F.	334, 335	Jeannerat, J.	317, 555
Holland, H. C.	516, 517, 518, 527, 692	Jennison, M. W.	448
Holleman, L. W. J.	765	Jenzen, A.	135
Homberger, E.	118	Jirgensons, Br.	766, 767
Hooft, C.	169, 170	Johnson, M. L.	106, 891
Hoppe-Seyler, <u>E</u> 7, F. <u>I</u> 7.....	172	Johnston, W. W.	449
Hoppe-Seyler, G.	292, 293	Jones, D. B.	950, 951
Horn, M. J.	950, 951	Jones, F. L. Seymour - see Seymour-Jones, F. L.	
Horwitt, M. K.	811	Jones, W. M.	953
Houck, R. C.	789, 790	Jong, H. G. B. de.....	765
Hough, A. T.	678, 952	Jordan-Lloyd, Dorothy - see Lloyd, D. J.	
Howe, P.	153	Jovanovits, J. A.	450, 578
Howes, E. L.	119	Jullien, L.	67
Huggins, M. L.	253	Kaesberg, P.	954
Humphrey, J. H.	830, 831	Kalb, G. H.	707
Hunt, F. S.	499	Kanagy, J. R.	336, 361, 364, 679, 906, 907, 955
Hunter, H. L.	854	Kaplan, V. A.	553
Huzella, T.	19, 254	Karssen, A.	247
Ishidate, M.	832	Kashina, T. S.	781
Jacoby, T. F. ...	373, 622, 623, 624, 625, 626	Katersky, E. M.	297
Jakus, M. A.	244, 255, 274, 275		

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Katz, J. R.	....240,241,256,257,258,579, 580,581,582,583,584	Kotov, M. P.	.....260
Kaunitz, P. E.	.....923	Koval, V.	.....768
Kaverznev, E. D.	.....670	Kowalewski, J. F.	.....451
Kaye, M.	.....68,173,585	Krajian, A. A.	.....69
Keller, R.	.....337	Kratky, O.	.....261,959,960
Kelly, M. W.	.....432,540,541,629,630	Krause, A. C.	.....294,295
Kendall, J. I.	.....956	Kreis, J.	.....122
Kenten, R. H.	.....901,902,903,904,905	Kr ^ü ger, D.	.....769
Kenyon, J.	.....727	Kruyt, H. R.	.....570,586
Kernot, J. C.	.....402	Krylova, N.	.....296
Kersten, Harold - see Kersten, H. J.		Kubelka, V.	.....587,588,589,590
Kersten, H. J.	.....251,252,726	K ^ü ntzel, A.	.....70,71,72,174,262,338, 339,340,404,405,406, 407,408,409,410,411, 412,413,414,415,416, 417,452,453,454,455, 456,520,521,591,592, 680,681,682,683,770, 771,772,773,774
Kirby-Smith, H. T.	.....9	K ^ü thy, A. von.....	.....593
Kirst, W.	.....957	Kutyandin, G. I.	.....522,961
Klemperer, P.	.....120,121,958	Lafrancaise.....	.....493
Klenk, L.	.....330	Laguess, E.	.....175
Kleppinger, C. T.	.....996	Lamarque, P.	.....263
Knaggs, J.	.....402,403	Lamb, M. C.	.....665
Knake, E.	.....20	Lambert, R. A.	.....123
Knödel, G.	.....587,588	Lang, K.	.....292,293
Koepff, H.	.....774		
Koester, H.	.....714		
Koisi, S.	.....259		
Kolkmeijer, N. H.	.....245,573		
König, J.	.....764		
Kostenko, A. S.	.....519		

<u>Author</u>	<u>Reference</u>
Lang, W. W.	129
Lange, Gustav.....	729
Larson, C. E.	821
Latschar, C. E.	289
Lee, A. B.	73
Lengyel, J.	19
Lennox, F. G.	962,963
LePlat, G.	74,418,684
Levi, G. M.	21
Levi-Montalcini, R.	22
LeViet, L.	602
Levis, M. R.	23,24
Lewis, W. H.	24
Li, T. T.	411
Lieben, F.	833
Liesegang, R. E.	775
Lightfoot, L. H.	964
Lillie, R. D.	75,965
Lillie, R. S.	834
Lipatov, S. M.	556
Lloyd, D. J.	68,419,420,457,585,594, 595,596,597,598,599, 685,776,777,778,779, 835,836,837,838,839, 840,841,842,843,844,966
Loeb, J.	845
Loeb, L.	124
Lohr, H. A.	17,18,571

<u>Author</u>	<u>Reference</u>
Loiseleur, J.	125,332,600,846
Lomax, R.	219
Loofbourow, J. R.	967
Lottermoser, A.	421
Lowry, O. H.	297
Loy, H. W.	289
Lucas, C. C.	356
Lucien, M.	25
Lustig, E. Sacerdote de - see Sacerdote de Lustig, E.	
Macaigne, M.	126
McCandlish, D.	552
McCarty, K.	927
McClellan, D.	462
McDonald, F.	16
MacFadyen, D. A.	376
Macfarlane, R. G.	127
Machon, H.	485
Mackey, A. R.	285
McKinney, R. L.	30
Mackintosh, D. L.	289
McLaren, A. D.	914
McLaughlin, G. D. ..	342,422,423,523,524, 525,554,687,688,689
MacLennan, J. D.	127
McNally, J. G.	791

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Macpherson, H. T.	365	Milhailov, A. N.	603,781
Maksimow, A. A. - see Maximow, A. A.		Miller, E. G., Jr.	806
Mall, F. P.	176	Miller, J. C.	285
Mallory, F. B.	76,77,177,178	Minnaert, M.	572,573
Manning, C. R.	341	Mitchell, H. H.	298,299
Mardashev, S. R.	968	Modderman, R. S. T.	765
Mardles, E. W. J.	780	Moeller, W.	466
Markley, K. S.	847	Mollendorff, W. von.	31
Marquard, W.	686	Monserat, J. L.	80
Marquardt, G.	456	Montagna, W.	970
Marriott, R. H.	366,419,458,459,460, 598,599,601,840,841	Montalcini, R. Levi - see Levi-Montalcini, R.	
Martin, A. J. P.	762,817,818	Moor, S.	367,971,993
Martin, D. E.	235	Morgan, A. F.	283
Maschmann, E.	461	Morgulis, S.	303
Maseritz, I. H.	128	Morin, G.	81,82
Maximow, A. A.	26,27,28,78,179	Morrione, T. G.	972
Mazoué, H.	29	Morse, W.	300,850
Mendeloff, J.	79	Moskova, I. S.	393
Menschel, H.	613	Moskova, Yu. S.	425,467,468
Merrill, H. B.	463,464,465,491,492, 690,691,848,849,969	Mossman, H. W.	973
Meunier, L.	315,343,344,345, 424,526,602	Moyer, L. S.	544
Meyer, K. H.	264,265,316,317,555	Mulder, G. J.	851,852
Michallet, L.	653,654,655	Müller, J.	853
Michelman, J.	730	Mullin, C. E.	854
		Murphey, C. E.	285
		Murphy, G. E.	974
		Myers, V. C.	129,281

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Nagotte, J.	32,33,34,35,36, 63,83,84,85,86, 87,130,131,132, 133,134,180,181, 182,183,576,802, 855,856	Orekhovich, V. N.	976
Nauen, F.	469	Ottens, E. F.	539
Nersesova, E. N.	358	Page, A. W.	475
Neumann, S.	743	Page, R. O.	475,527,604, 605,692,977
Nicaud, P.	126	Pankhurst, K. G. A.	606,978
Niedercorn, J. G.	470	Parker, E. A.	236
Niemann, C.	746,809	Parker, F.	178
Nilssen, B.	857	Parker, R. C.	39
Noer, H. R.	973	Partridge, S. M.	980
Northrop, J. H.	471,472,473,782	Pasqualino, A.	186
Nutting, G. C.	858,975	Patten, A. R.	368
N. V. Koninklijke Pharmaceutische Fabrieken voorheen Brocades-Stheeman & Pharmacia.....	728,731,732,733, 734,735,736	Pauling, L.	859
Oakley, C. L.	474	Pautrier, L. M.	138
Oberling, C.	135	Pavlov, S. A.	426,428,607,875,876
Odiette, D.	185	Pavlovich, R. H.	137
O'Flaherty, F.	184,513,688,803,804	Pchelin, A. A. - see Ptschelin, A. A.	
" Ökrös, S.	136	Petersen, H.	266
Olefnikova, E. I.	486	Pfeiffer, H. H.	41
Olivo, O. M.	37,38	Philips, J.	413,414,415
Onclay, J. L.	788	Philips, V.	412
Orekhovich, K. D.	976	Phillips, H.	380,842
		Picken, L. E. R.	267,981
		Picker, W.	737
		Pincus, P.	982

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Pirie, A.	140,979	Queroix, M.	526
Pischinger, A.	42	Radice, J. C.	141
Pleass, W. B.	495,496,497,498,599, 778,779,783,784	Rafferty, G. T.	235
Plimmer, R. H. A.	860	Ralston, A. W.	439
Plotinkova, N. E.	976	Rathery, F.	142
Pohlman, R.	268	Rautenstrauch, W.	694
Pojarlieff, G.	435,436	Reed, H. C.	861
Policard, A.	88	Reed, R.	984,985
Pollack, A. D.	120,121,896	Rees, M. W.	369
Popa, G. T.	187	Reitstötter, J.	755
Porter, E. C.	608,609,610	Retzsch, C. E.	514,676
Porter, K. R.	269	Rex, R. O.	9
Porter, R. E.	687,693	Rezabek, G.	695
Pototschnig, B.	455	Reznichenko, M. S.	862
Powarnin, G.	611	Richards, A. N.	188
Prakke, F.	72	Richardson, K. C.	986
Prebus, A. F.	270	Riederle, K.	328
Preisenzanz, W.	416	Riesen, W. H.	947
Proctor, H. R.	612,785,786	Riess, C.	520,521
Prudent, Inez.....	983	Rigaut, O.	122
Pryor, M. G. M.	981	Rimington, C.	863
Ptschelin, A. A.	528	Rinehart, J. F.	189
Pullinger, B. D.	139,140	Robertson, M. E.	457
Pund, E. R.	898	Robertson, W. v. B.	143,987
Queido, A.	43	Rochemont, R. D. de.....	148,640
		Roddy, W. T.	89,90,803,804

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Rogers, H. J.	864	Schachowskoy, Th.	389
Rogers, J. S.	426a	Schade, H.	613
Rohm and Haas Co.	91	Schein, A.	812
Rooy, A. de.	258	Scherer, J.	870
Ropes, M. W.	143	Schiaparelli, C.	531,698
Rosenbohn, A.	107	Schleich, H.	329,355
Roulet, F.	161,162	Schlesinger, M. J.	284
Rousselot, A.	787	Schmiedeberg, O.	191
Rozynek, M.	44	Schmitt, F. O.	244,272,273,274, 275,933,988,989
Rudall, K. M.	271,984,985	Schneider, F.	301,330,350,446
Ruf, R.	190	Schneider, J.	805
Rumery, R. E.	997	Scholl, A.	764
Runjantzew, A. W.	45	Schosnig, F.	144
Russ, A. Colin = see Colin-Russ, A.		Schröder, G. D.	871
Rutherford, H. A.	370	Schultze, M.	872
Sacerdote de Lustig, E.	22,46	Schwank, M.	417
Sadikov, V. S.	346,347,348,349,427, 476,477,696,697,865, 866,867,868	Schweikert, E.	424
Sakaguchi, T.	832	Scott, D. B.	99
Salcedo, I. S.	515,529	Seitz, A.	174
Salle, A. J.	869	Sekora, A.	261
Samec, V.	589	Semina, L. A.	968
Sandison, J. C.	47,48	Senti, F. R.	858,991
Scatchard, G.	788	Seymour-Jones, F. L.	478,479,480, 489,709
Schaad, J. A.	234,236	Sheppard, S. E.	789,790,791
Schachowskoy, F.	530	Shestakova, I. S.	607
		Shimanovich, S. B.	519

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Shimidzu, M.	614	Stearns, M. L.	194,195
Shore, A.	843	Stecker, H. C.	401,700
Shuravliev, D.	873	Stefanovich, I. P.	487
Siegfried, M.	192	Steigmann, A.	794
Siegmund, W.	321	Stein, W. H.	311,367,371, 806,971,993
Silberstein, V.	727	Steinhardt, R. G.	627
Simskaya, A.	442,443	Stiasny, E.	488,701,702,703,793
Sirny, R. J.	930	Stockall, G.	420
Sizer, I. W.	481,967	Stoppoloni, G.	92
Smith, A. L.	370	Stott, E.	881,882
Smith, E. C. Bate	351,874	Stoves, J. L.	883
Smith, P. I.	792	Strangeways, T. S. P.	49
Smorodintsev, I. A.	428,482,483, 484,875,876	Straumann, R.	108
Sokolov, S. I.	429,563,615,616, 641,642,753,877	Strauss, F.	103
Sookne, A. M.	548	Street, A.	220
Soubiran	315	Stubbings, R. L.	994,995
Speakman, J. B.	878,879,880,881,882, 883,884,885,886	Studnicka, F. K.	93,196
Spencer, H. C.	302,303	Suntzeff, V.	124
Spiegel-Adolf, M.	992	Suntzowa, W. W.	45
Spiers, C. H.	494,699	Svegvari, A.	163
Ssadikow, S. - see Sadikow, V. S.		Swann, N. M.	981
Stacheyeva, E.	325	Swift, H. F.	974
Stagner, B. A.	738	Sydenstricker, V. P.	898
Stakheeva-Kaverzneva, E. D.	486	Synge, R. L. M.	762,817,818
Standenath, F.	193	Tacheci, T.	421
Stather, F.	485		

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Tadokoro, T.	372,887	Troitzkaja-Andreeva, A. M.	97,98
Tandler, R.	352,569,833	Tschernow, N. W. - see Chernov, N. V.	
Tansley, K.	10	Tsi Tchoune Li - see Li, T. T.	
Taussig, I.	590	Turley, H. G.	99
Taya, S.	532	Tustanovskii, A. A.	976
Tebb, M. C.	197	Ujsagby, P.	95
Techoueyres, E.	198,199	Unna, P. G.	100,200
Tenney, B. J.	94	Urbain, A.	125
Terrasse, G. L.	353	Urtubey, L.	101,201
Than, F.	795	Vail, G. E.	289
Thanhoffer, L.	95	Valle, G.	102
Thaureux, J.	617,618	Vandegrift, G. W.	202
Thayer, F. D., Jr.	470	Van Heyningen, W. E.	899
Theis, E. R.	228,373,533,534, 535,536,537,538, 539,619,620,621, 622,623,624,625, 626,627,689,704, 705,706,707,708, 994,995,996	Van Slyke, D. D.	375,376
Thiele, H.	436	Van Vlimmeren, P. J.	998
Thomas, A. W.	430,431,432,489,540, 541,628,629,630,709	Vassos, G. A.	145
Thomas, B. H.	304	Vinetskaya, E. Ya.	631
Thomas, J. A.	96	Vogel.....	888
Tiffeneau, R.	142	Von Kuthy, A. - see Kuthy, A. von.	
Tobin, C. E.	997	Von Mollendorff, W. - see Mollendorff, W. von	
Tomlinson, J.	946	Von Volkmann, R.	103
Townend, F.	884,885	Voss, K.	360
Tracy, G.	490	Wail, S.	146
Tristram, G. R.	374	Waitkoff, H. K.	928

<u>Author</u>	<u>Reference</u>	<u>Author</u>	<u>Reference</u>
Warns, E. H. J.	.....247	Woods, H. J.	.....221,222
Warrack, G. H.	.....474	Worschitz, F.	.....279
Warren, W. J.	.....236	Wolbach, S. B.	.....151,152,153
Watanabe, K.	.....796	Wright, A. W.	.....154
Weidinger, A.	.....171,246,580,581, 582,583,584,816	Wright, B. A.	.....1006
Weidner, C. L.	.....708	Wright, J. H.	.....77
Weir, C. E.	.....999,1000,1001	Wrinch, D. M.	.....889
Weiss, P.	.....203	Wrixton, C. H.	.....969
Werner, M. (Kiel)	.....147	Wyckoff, R. W. G.	.....238,280,990
Whewell, C. S.	.....886	Wyssling, A. - see Frey-Wyssling, A.	
Wilder, V. M.	.....303	Yang, S. H.	.....924
Williams, D.	.....710	Yensen, M. M.	.....890
Williams, J. W.	.....788	Yoder, L.	.....304
Williams, R. G.	.....9	Yuditskaya, A. I.	.....1007
Wilson, E. O.	.....543	Yu, S. C.	.....543
Wilson, J. A.	.....104,491,492,542, 612,632,633,634, 711,712,786	Zaides, A. L.	.....641,642,1008
Winetzkaja, E. J.	.....635	Zervas, L.	.....355
Woelfflin, R.	.....799,800,801	Zimmerman, R. L.	.....299
Wohlisch, E.	.....148,149,150,636, 637,638,639,640	Zitzlsperger, S.	.....105
Wolbach, S. B.	<u>see</u> below	Zotov, G. V.	.....643
Wolf, J.	.....50,51,52,53,54	Zurhelle, E.	.....155
Wolfe, J. M.	.....154,921		
Wolff, R.	.....493		
Wolpers, C.	.....268,276,277,278,1002, 1003,1004,1005		

S U B J E C T I N D E X

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Absorption, acid.....	407,416	Acid(s) - Continued	
spectra, ultra-violet.....	967	tartaric, in preparation of	
water, by collagen and leather...	556	adhesives.....	686
Acetyl-glucosamine, estimation of....	830	Adhesions, peritoneal.....	117
Acid anilin dyes - see Dyes		Adhesives, preparation of.....	686
Acid(s)		Adsorption.....	551,587,589,590
acetic, effect on hide powder...	426a	Albumin, egg, structure of.....	746
action on		Albuminoids.....	807,815
collagen solutions.....	398	Aldehydes, tanning power of.....	507
hide powder.....	421,426a	Alkali(s)	
hide substance.....	411	action on collagen..	309,403,413-415,429
amino - see Amino acids		effect on collagen.....	901,904
ascorbic (Vitamin C).....	5,29,43,46,143,152,987	Amino acid(s)	
combination with proteins.....	836	basic, in	
for lime removal from skin.....	409	collagen....	362,363,365,373,902,903,994,995
formic, pickles.....	416	keratins.....	811
hydrochloric		proteins.....	365
combination with collagen....	378	chromatography of.....	374,971,993
effect on collagen.....	403	composition of	
equilibrium with collagen....	643	casein.....	947
sodium chloride pickles.....	407	collagen.....	902,903
swelling curve of collagen...	400	eukeratins.....	812
titration curve of collagen..	400	gelatin.....	752,902
inorganic (mineral)		gramicidin.....	818
effect on		isinglass.....	356
collagen fibers.....	404,405	proteins.....	357
fish skins.....	402	scleroproteins.....	928
lactic, effect on hide powder...	426a	determination.....	311,357,752,993
lignosulfonic, reaction with		dicarboxylic, in collagen..	902,903,994,995
collagen.....	940,946	Amino nitrogen - see Nitrogen, amino	
hide substance.....	510,511	Amnion, electron microscopy of.....	973
monoamino, determination by		Ammonia, origin in lime liquors.....	366
chromatography.....	374	Amyloid, formation in the body.....	191
nitrous, action on		Analysis	
collagen.....	377	amino acid - see Amino acid	
hexone bases.....	860	determination	
organic		tannin.....	662
effect on		x-ray - see X-ray analysis	
fish skins.....	402	Anatomy, microscopic, vertebrate....	956
hide powder.....	426a	Aniline-blue collagen stain.....	75,76
glacial, protein solutions		Anisotropy, magnetic.....	814
in.....	821	Antibodies, formation of.....	859
pickles.....	407,416	Antiseptics in leather production...	645
rhodanilic, in determination		Aorta, thoracic, aging process in...	129
of l-proline.....	745	Arginase, skin.....	968
salts, for lime removal from		Arginine, determination of.....	950
skins.....	409		
sulfuric, hydrolysis.....	749		
sulfuric, pickles.....	416		

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Arteries		Bone(s) - Continued	
aging changes in.....	98	undecalcified, method for	
collagen in.....	97	cutting.....	894
Arteriosclerosis, collagen in.....	116	x-ray diffraction studies of.....	237,263
Arthus phenomenon.....	147	Bromine, effect on proteins.....	833
Ascorbic acid - see Acid, ascorbic		Brownian movement of collagen	
Aspergillus oryzae, proteases of.....	486	fibrils.....	247
Astrocytoma, pseudo-papillary.....	135		
Azan staining method.....	103		
		Calfskin, action of trypsin on.....	464
Bacteria, proteolytic, action on		Cancer formation, biochemistry of....	107
collagen and elastin.....	451	Cancer, lung.....	141
Baryta, action on human hair.....	886	Capacity, acid-binding.....	935
Base(s) - see also Alkalis		Carbohydrates in collagen...307-309,329,	330
action on		Carcinoma, spherical bodies in...926,927	
collagen.....	388	Carcinogens.....	119
gelatin solutions.....	770	Cartilage	
combination with proteins.....	836	chondroitin sulfate in.....	980
hexone, effect of nitrous acid		composition of.....	953,970
on.....	860	hyaline.....	156
organic, effect on collagen.....	901	proteolysis of.....	982
Bate(s)		Catgut.....	668
effect on collagen fibers.....	573	Cell(s)	
fermentative.....	455	cancer.....	123
value of.....	450,456,491	connective tissue.....	177
Bating.....	437,438,440,455,459,	living, study of...1,9,47-49,194,195	
	463,466,492,945	mesenchyme.....	7,8,24
Beef, quality of.....	289	physical chemistry of.....	829
Biochemistry of		tissue culture, electron	
cancer formation.....	107	microscopy of.....	269
skin.....	585	Cellulose.....	231,546
Biological Stain Commission,		Chambers, transparent in rabbits'	
methods used by.....	59	ear.....	1,9,47,48,194,195
Biology		Chemistry of	
electron microscopy in.....	988	catechin tannin.....	310
X-ray diffraction studies in.....	992	cell surfaces.....	544
Blood, ox, glucosaminodimannose		collagen.....	586
from proteins of.....	363	colloids.....	808
Bodies, collagenous, behavior		connective tissue.....	980
toward light.....	565	gelatin.....	586,747,748
Body, collagen in the.....	118	glue.....	586
Bond, hydrogen.....	214,634,944	integument.....	300,850
Bone(s).....	853	leather.....	393
biochemical studies of.....	290,291	leather manufacture..104,689,711	
collagen, combination with HCl...378		tanning.....	596
digestion by Phormia regina		proteins.....	828,835,843
larvae.....	128	skin.....	286,310
glutin from.....	566	proteins.....	675
proteolysis of.....	982	physical, of collagen.....	615,870
tissue elements of.....	172	tanning.....	671,820

<u>Subject</u>	<u>Reference</u>
Chlor-chondrin.....	871
Chloride(s)	
chromic, tanning property of.....	505,538
in dog tendons.....	287
Chondrin(s).....	851,852,888
Chondroitin sulfate.....	980
sulfuric acid.....	191
Chordae tendinae, x-ray study of.....	923
Choroid, chemical composition of.....	294,295
Chromatography.....	374,817,909,993
Chrome	
combination with collagen.....	644
fixation by collagen.....	937
Cirrhosis.....	111,114,972
Clostridium welchii.....	474,899
Clot (coagula), collagenous.....	130-132
Collacin.....	200
Collagen(s)	
A.....	134,317
absorption spectra, ultra-	
violet.....	967
acetylation of.....	380
acid-base binding capacity	
of.....	623,624
acid binding power.....	423
adsorption of water vapor.....	929
affected by	
acids.....	403
aliphatic diazo compounds.....	957
alkali(s).....	309,403,413-415,429,
904	
metals.....	428
sodium hydroxide.....	403
ascorbic acid.....	143
enzymes.....	907
hydrogen peroxide.....	143,1002
nitrous acid.....	377,424
palatine fast dyes.....	389
pancreatin.....	436
potassium thiocyanate.....	393
proteinases.....	945
proteolytic bacteria.....	451
salts.....	426,607
saturated lime solutions.....	401
trypsin.....	443,444,446,458,460,
475,478-480,488,938	
vegetable tanning.....	893
amido nitrogen of.....	318
amino acids in - see Amino acid	
amino nitrogen of.....	361,364
antigenic properties of.....	125
B.....	134,317

<u>Subject</u>	<u>Reference</u>
Collagen(s) - Continued	
basic amino acids of.....	362,363,365,
373,902,903,994,995	
effect of calcium hydroxide	
on.....	373
basic reactions of.....	338
basophile.....	200
boiling temperature of.....	607
bonding with	
sulfite cellulose extracts...	961
syntans.....	961
bone, combination with HCl.....	378
carbohydrates of.....	307-309,329,330
catalyzed.....	346
chemistry of.....	333-336
chromates.....	500
chrome tanned.....	251
clots (coagula, coagulated,	
coagulum).....	19,35,84,130-132
colloid chemistry of.....	586
combination with	
acids - see Acid(s)	
alkalis (bases) - see Alkali(s)	
chrome.....	644,937
dyes.....	381-385
iron salts.....	500
phenol.....	417
tannin.....	527,604
combining weight of.....	300
composition of.....	336
constitution of.....	313
corena, ox, effect of mustard	
gas on.....	979
deaminated.....	377,387,424,431
reaction with	
chrome.....	503
formaldehyde.....	497,537
reactivity of.....	905
degeneration.....	146
in dermatosis.....	115
degradation.....	142
denaturation.....	340
denatured, salt.....	626
derivatives, see Derivatives,	
collagen	
determination...	283,284,287,292,293,
296,297,299,302-304,948	
diseases.....	120,121
dispersion in copper ammonium	
solution.....	563

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Collagen(s) - Continued		Collagen(s) - Continued	
disposition in		preparation and purification	
Auerbach's plexus.....82		of..305,311,321,323,332,333,340,	
pansacral nerve.....81		343,344,349,378,711,	
distribution in guinea pig.....964		822,903,906,907	
electrochemical properties of....643		reaction(s) with	
electron microscopy of...244,272-276,		alkali metals.....428	
278,975,989,1002-1004		carbon disulfide.....427	
electrophoresis of.....548,906		chrome aquo salts.....512	
elementary composition..314,322,334,		formaldehyde.....939	
335,341,870		lignosulfonic acid.....940,946	
esterified, reactivity of.....905		quinone.....526,535	
expansivity of.....1000		tannin, sulfite cellulose	
fibers, see Fiber(s)		extract.....522	
collagen		tannin, wattle.....977	
fibrous, tension equilibria		reactions for.....319	
of.....638		reactive groups of.....936	
fixation of water by.....562		relation to reticulin.....154	
floculation of.....600		selective staining of.....75	
formaldehyde tanning of..495,496,498		shrinkage of.....962,963,966	
free amino groups of.....539		shrinkage temperature...580-584,630	
gel.....84		shrunken, for determining	
heat denaturation of.....568,936		bating value.....456	
heat denatured, acid-base		skin.....66,325	
binding capacity of.....625		acid-base binding power of...622	
heat of combustion of.....341		amino acids (basic and	
heat of transformation during		dicarboxylic) of....994,995	
lime treatment.....410		human, electron microscopy	
hide, bovines		of.....933	
affected by trypsin.....938		pathology of.....138	
combination with HCl.....378		solubility in dilute acids...34,35,	
properties of.....347		130-134,418	
histological reaction for.....501		solubility of.....112,617	
hydration of.....631,635		soluble, properties of.....323	
hydrogen bonding of dehydric		steer hide, chemistry of.....400	
phenols by.....944		structure of.....305,334,335,552	
hydrolysis to gelatin 312,315,316,		subcutaneous.....85,87	
318,322,351		swelling of.....95,110,388,390,400,	
hydrothermal		403-407,416,421,469,490,	
denaturation of.....936		560,561,564,582-584	
stabilization of.....942		during liming.....379	
insoluble, for closing wounds....13		in HCl.....419	
intestinal wall.....234		influence of proteases on...110,	
iso=electric point of....429,906,907		490	
methylation of.....380		tampons.....113	
		tanned	
		affected by trypsin.....674	
		physico-mechanical	
		properties.....547	
		stability of.....616	

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Collagen(s) - Continued		Corium, histology of.....	65
tanning with vegetable tannins		Cornea,	
in aqueous organic solvents..	969	capillary formation in.....	898
tendon		collagen fibers of.....	56
activation of.....	1001	Crystallization, reversible, in	
catalytic decomposition of...	348	tendons.....	557
combination with HCl.....	378	Curves, titration	
properties of.....	347,1001	collagen.....	903
thermic transformation of.....	617	in HCl and NaOH.....	400
thermodynamics of.....	636,637,640	feather keratin.....	884
thermolability.....	630	protein fibers.....	838
titration curve.....	903	wool keratin.....	881
treatment with		Cuticle, earthworm, electron	
alkali	429	microscopy of.....	984
natural salts.....	567		
tyrosine content of.....	360	Darmstadt, work in progress at.....	702
tryptic digestion of.....	435,489	Depilation.....	694
two (II).....	316	chemical.....	683
		Derivatives, collagen	
ultra-violet absorption spectra..	967	aging of.....	553
uptake of water by.....	901	physical chemistry of.....	615
vegetable tanned.....	251,262	Dermatology.....	235
water diffusion into.....	603	Dermatosis, chronic.....	115
wet, effect of temperature on....	999	Differences, sex, from standpoint	
x-ray study of.....	204=226,272	of biochemistry.....	887
Collagenase, from Clostridium		Diffusing factors.....	830
welchii.....	474,899	Diketopiperazines of leather.....	670
Colloid(s).....	230	Dioxopiperazines, skin collagen.....	325
lyophillic.....	765	Dye(s)	
osmotic pressure of.....	834	acid-analine.....	75
radioactive rays effect on.....	846	combination with collagen....	381-385
tissue.....	12	fat soluble.....	83
Colloidal behavior, theory of.....	845	palatine fast, action on	
Compound(s)		collagen.....	389
aliphatic diazo, action on			
collagen and keratin.....	957	Ear, rabbit, transparent chamber	
chrome-collagen.....	673	in.....	1,9,47,48,194,195
chromium.....	504	Earthworm cuticle.....	984
collagen-tannin.....	691	Edema.....	110,613
colloidal.....	665	Elacin.....	200
organic		Elastic tissue - see Tissue, elastic	
halogen.....	583	Elasticity, rubberoid.....	639
sulfur.....	582	Elastin.....	184,188,200,490
Concept, micellar.....	231,239	absorption of water.....	800
Conjunctiva, chemical composition		action of proteolytic bacteria	
of.....	295	on.....	451
Connective tissue, see Tissue,		adsorption of water vapor by....	929
connective		composition of.....	806
		see also Amino acid(s)	

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Elastin - Continued		Enzyme(s) - Continued	
determination of.....	297,304	cod.....	449
effect of		effect on elastin.....	805
enzymes on.....	805	general.....	433-492
potassium thiocyanate on.....	393	haddock.....	449
elastic properties of.....	797	in edema formation.....	110
in beef muscle.....	983	pancreatic.....	492
in lung.....	141	proteolytic.....	445,455,457
rearrangement temperature of.....	797	from mushrooms.....	434
skin.....	66,138	reactions with collagen.....	347
thermal transformation of.....	798	Epidermis, mammalian, fibrous	
titration curve of.....	801	proteins of.....	160
Electrolyte(s)		Equilibria, tension of fibrous	
colloidal.....	837	collagen and rubber.....	638
effect on		Erythema, radium.....	155
collagen hide fibers.....	578	Estrogen, effect on mouse vagina	
gelatin.....	756	cervix and stroma of uterus.....	124
human skin.....	288	Explants, osteogenetic.....	43
influence on osmotic pressure		Extract(s)	
of colloids.....	834	sulfite cellulose.....	961
Electron microscope		testicular.....	462
in biology.....	988		
in dermatology.....	235	Fabric(s).....	216
Electron microscopy.244,269,270,272-278,		protein.....	889
910,926,927,931-933,		Factors, diffusing.....	462,830,831
953,973,975,984,985,		Fat, of dog tendons.....	287
988-990,1002-1004		Feather rachis, x-ray study of.....	225
of amnion.....	973	Fever, rheumatic.....	974
of collagen.....	975,989,1002-1004	Fiber(s).....	216,220,221
of human skin.....	933	animal	
earthworm cuticles.....	984	mechanochemical method	
elastic tissue.....	932	for use with.....	880
muscle.....	985	sulfur linkage in.....	878,879,
sarcolemma.....	953	883,886	
sodium hyaluronate.....	931	argyrophillic.....	26-28
teeth.....	990	demonstration in	
tissue sections.....	926,927	connective tissue.....	105
Electrophoresis of		biological, structure of.....	892
collagen.....	548	collagen.....	144,213,266,279,
modified collagen.....	906	557,569,1008	
Element(s)		acid contraction of.....	150
histological, staining method		alkali swelling of.....	390
for.....	67	arrangement in veins.....	64
tissue.....	172	artificial.....	649,650
elastic.....	277	behavior in cultures.....	21
Embryo(s), fowl.....	21,23	characteristics in vitro	
Endometrium, collagen, network of....	122	culture.....	22
Endothelium, capillary.....	159,189	cornea.....	56
Eukeratins		deaminated.....	387
amino acid composition of.....	812	development of.....	22,26-28
Enzyme(s)		differentiation in vitro.....	37
blow-fly larva (lucilia			
Serecatio).....	447		

<u>Subject</u>	<u>Reference</u>
Fiber(s) - Continued	
double refraction of.....	262
effect of	
lime-sodium sulfide	
mixture on.....	391
liming on.....	392
elastic properties of.....	265
fine structure of.....	71,72
for precipitation of lime....	108
formation in cultures of	
connective tissue.....	20,27
formaldehyde tanned.....	941
genesis of.....	18,38
hide.....	578
in arteriosclerosis.....	116
mechanically deformed.....	252
metamorphosis of.....	25
method for demonstration in	
connective tissue.....	105
frozen sections.....	69
molecular structure of...213,218	
	265,272,279
morphology of.....	72
muscle, acid contraction of..	150
non-tendon.....	57
optical properties of.....	699
origin of.....	18,38,50,51
pretanned.....	260
production of	
from fibrillar sols.....	54
in vitro.....	16
properties of.....	594
thermoelastic.....	150
sclerotic.....	56
strength of.....	908
structural stability of.....	949
structure of.....	591,592,641
swelling of.....	147,387,404-407,
	450,593,601
tanned.....	64,252,680,941
tendon.....	57
collagenic - see Fiber(s) collagen	
collagenous, development of.....	2
from reticulum.....	30
in tissue cultures.....	26-28,30
nature and origin of.....	18
in great omentum of rodents..	101
mechanical significance of..	156
connective tissue	
action of ascorbic acid on	
formation of.....	29
development in tissue	
cultures.....	23

<u>Subject</u>	<u>Reference</u>
Fiber(s) - Continued	
elastic.....	265,266
high-molecular.....	877
keratin.....	22,271,824,825
muscle, thermoelastic	
properties of.....	150
organic.....	257
protein.....	204,205,208,224,
	225,253,819
molecular configuration in..	858
structure of.....	966,991
swelling of, in organic	
solvents.....	598,599,601,
	841,844
tensile properties of.....	858
titration curves of.....	838
reticular	
development in vitro.....	22
histogenesis, in mammals.....	2
reticulum, method for	
demonstration in frozen	
sections.....	69
skin	
animal.....	839
argyrophillic of.....	66
tissue culture.....	30
Fibril(s)	
collagen	
affected by	
formaldehyde.....	501
anatomic.....	86
artificial.....	86
cultures in vitro.....	38
polarizing microscope	
measurements of.....	41
formation in Jensen	
sarcoma in vitro.....	44
molecular structure of.....	597
structure and growth of.....	35
collagenic, of connective	
tissue.....	163
collagenous, origin, structure,	
arrangement.....	17
connective tissue.....	161,247,561
reticular.....	159,189
Fibrin.....	110,258,490,746,809
Fibroblast(s).....	6,39,40
Fibroin.....	380,495,623,769
Fibrosis, myocardial.....	284
Filtrates, bacterial culture.....	462
Foods, amino acid composition of.....	357
Formaldehyde	
action on gelatin.....	760

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Formaldehyde - Continued		Gelatin - Continued	
combination with		sperm whale.....	796
collagen.....	495, 496, 498, 939, 942	strongly stretched	
keratin.....	495-498	preparations of.....	240
silk fibroin.....	495	structure of.....	745, 756
determination.....	676, 681	swelling.....	744, 770
		tanned, stability of.....	616
		thermodynamics of.....	637
		tyrosine content of.....	360
Galactose.....	309	Gels	
Gangrene, gas, toxemia.....	127	gelatin.....	753, 755, 789, 790
Gas, mustard		mutarotation of.....	771
action on ox cornea collagen.....	979	high molecular.....	877
distribution in tissues.....	895	Gland(s)	
Gelatin.....	256, 257, 317, 322, 351, 570, 579, 612, 739-796	adrenal, female rats,	
absorption of water by.....	776-779, 783, 784	connective tissue of.....	921
acetylation of.....	380	mammary, contractile	
affected by		tissues in.....	986
alkali.....	429	Globulins, muscle.....	483, 484
electrolytes.....	756	Glucosamino dimannose.....	863
formaldehyde.....	760	Glue - see Gelatin and	
heat.....	775	glue (739-796).....	257, 739, 743, 759, 792
neutral salts.....	793	chemistry of.....	748
pancreatin.....	456	collagen and.....	781
amino acids in.....	311, 752, 902	colloid chemistry of.....	586
chemistry and determination of....	747	Glutin from bone and skin.....	566
coagulated.....	751	Glutokyrin.....	328
colloid chemistry of.....	586	Glycine	
cowhide, partial acid		determination of.....	367, 368
hydrolysis of.....	762	discovery of.....	749
degradation products of.....	767	Glycogen of human cartilage.....	970
demineralization of.....	787	Glyoxal, action on hide protein.....	934
elementary composition of.....	341	Goat.....	986
equilibrium with dilute HCl.....	785, 786	Gorgonin.....	810
estimation of.....	303, 764	Grain, histology of.....	65
from collagen.....	312, 774	Grafts, tendon.....	33
hydration of.....	631, 635	Gramacidin, amino acid	
hydrolysis of.....	782	composition of.....	818
incipient shrinkage of.....	606, 978	Groups	
iso-electric point of.....	429, 760	amino, aliphatic, determination	
methylation of.....	380	of.....	375
molecular structure of.....	217	guanidyl.....	942
molecular weight of.....	755, 767	reactive, collagen.....	936
origin of.....	794	Guinea pig, collagen	
particle shape of.....	767	distribution in.....	964
peptization by mixed liquids.....	780	Gut, surgical enzyme digestion	
precipitability of.....	766	of.....	481
preparation of.....	740-742		
production of.....	768		
proline content of.....	354, 355		

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Haematoxylin-dioxane-phosphomolybdic acid (stain for collagen and reticulin).....	96	Keratin(s).....	242,271,816
Hair.....	623	action of aliphatic diazo compounds on.....	957
amino acid composition of.....	812	amino acid composition of.....	810
animal, x-ray analysis of..	204,220,221	basic amino acids of.....	811
hydrolysis of.....	848,849	combination with formaldehyde..	495-498
Healing, wound - see Wound healing		cornification of.....	816
Heart		feather, titration curve of.....	884
dog, collagen, creatine, and phosphorus content of.....	281	secreted.....	227
normal and pathological, collagen content of.....	284	structure of.....	857
Hemoglobin, cattle.....	746	wool, titration curve of.....	881
Hide powder - see Powder, hide		K-toxin.....	474,899
Hide(s) - see Skins			
Hide substance - see Substance, hide		Lamb, tenderness of.....	285
Histogenesis (origin, development- in vivo) 2,3,14,17,18,32,42,50-52		Leather(s) - see 645-712.....	256,664
Histological technique...55,59,60,62,67,69,73-77,79,80,96,100,103-105,684		affected by trypsin.....	709
Histology.....56-58,61,63-66,68,70-72,78,81,82,85,87,88-92,94,97-102,104		adsorption of water vapor by.....	955
Hyaluronic acid.....	830	chemistry of.....	104,689,701,711
Hyaluronidase.....	830	chrome	
Hydrogen peroxide, action on collagen and thymonucleohistone..	143	moisture content of.....	672
		thermal stability of.....	673
		chrome tanned.....	682,803
		absorption of water by.....	556
		fixing of water by.....	562
		combined tanning matter of.....	663
		diketopiperazines of.....	670
		dispersion in copper ammonium solution.....	563
		expansivity of.....	1000
		fixation of tannin by.....	678
		formaldehyde tanned.....	676
		shrinkage temperature of.....	704
		fundamental structure of.....	58
		hydrolysis of.....	644
		hydrolytic action of acids on...411	
		manufacture.....	820
		biochemical problems in.....	696
		chemistry of.....	104,689,711
		method for testing.....	669
		microscopic examination of.....	646
		nitrogen determination of.....	710
		physical properties of,	
		bibliography.....	699
		shrinkage temperature of.545,611,647,648,651,652,656,661,669,677	
		sole, stability of.....	651,652
		soluble matter of.....	690,691
		vegetable tanned.....	656-661
		action of water on.....	690,691
Industry, leather, biological problems of the.....	920		
Infections, skin, rabbit by group A streptococci.....	974		
Inflammation			
allergic, collagen degradation in.....	142		
chronic, due to implanted collagen.....	139,140		
hyperergic (Arthus phenomenon)...147			
Integument, chemistry of.....	300,850		
Iris			
chemical composition of.....	295		
collagen and mucoid of.....	294		
Iron, fixation of hide substance by..	541		
Isinglass, amino acid composition of.....	356		
Jensen sarcoma.....	44		

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Leather(s) - Continued		Material(s)	
vegetable tanned - continued		bating.....	491
aged, soluble decomposition		biological, structural units of..	231
products of.....	679	collagenous, decomposition of....	324
wattle-bark tanned, water		living.....	232,233
solubles of.....	692	natural, large interplaner	
wet, effect of heat.....	565,647,652, 661,999	spacings in.....	236
x-ray examination of.....	685	tanning, vegetable.....	494
Lesions		Meat(s)	
cardiac, rabbit.....	974	cooked, collagen determination	
connective tissue.....	122	in.....	283
Leucine, determination of.....	367,951	determination of collagen in....	296, 299
Lewisite, distribution in		gelatin content of.....	795
tissues.....	895	lysine, methionine, and	
Light, polarized, action on		threanine content of.....	930
tissue (connective--muscular)....	136	Mechanism for basic chrome sulfate	
ultra-violet, action on		reaction.....	554
hide proteins.....	628	Medicine, x-ray diffraction studies	
Lime.....	454,496,774	in.....	992
removal from animal skin.....	409	Membrane(s)	
saturated solution, action		collagen.....	113
on collagen.....	401	natural, fibril orientation in...	981
sodium sulfide mixtures.....	391	Mercuric chloride, germicidal	
Liming.....	466	efficiency of.....	869
Linkage		Mesenchyme	
- CH = N -.....	883	cells.....	8
sulfur, reactivity of.....	878,879, 883,886	mitosis in.....	24
Lipids in human cartilage.....	970	human.....	7
Liquor(s)		vertebrate, fresh.....	196
lime, ammonia in.....	366	Methionine.....	898,930
tan,		Method(s)	
plumping in.....	605	histological, see Histological	
plumping power of.....	693	technique	
Liver, chemical composition of.....	293	Loehlein-Volhard, for enzyme	
Lucilia sericata (blow-fly).....	447	activity.....	470
Lupus erythematosus, disseminated...	120, 121,896	Microbiological	
Lymphatics, relation to		amino acid determination	
mesenchyme cells.....	8	by.....	950,951
Lymph nodes, adult rabbit.....	30	enzyme activity determination	
Lytrope series and theory of		by.....	470,491
tanning.....	549-551,580-584	photometric ninhydrin in amino	
Lytotropic substances and		acid chromatography.....	971
shrinkage of collagen.....	580-584	plumping.....	861
Lysine content of meats.....	930	solubility product, for amino	
Macromolecule(s).....	231,238	acid determination.....	367
Macrophage.....	6	staining, for	
		collagenous tissue.....	997
		fibers, collagen, elastin	
		and muscle.....	103
		histological elements.....	67
		tannin analysis.....	662

<u>Subject</u>	<u>Reference</u>
Method(s) - Continued	
technical, of the	
Army Institute of Pathology...	55
Micelle(s).....	231,239
gelatin.....	248,761
Microscope, polarizing.....	41
Microscopy, electron - see Electron	
microscopy	
Micro-tannology.....	688
Mixtures, buffer.....	452,453
Molecule, keratin, structure of..	882,885
Morphology, submicroscopic.....	925
Mucoid, of elastic tissue.....	188
Muscle(s)	
beef	
collagen content of.....	983
connective tissue content of..	298
elastin content of.....	983
clam.....	225
connective tissues of.....	186
dystrophic, collagen content	
of.....	303
electron microscopy of.....	985
striate.....	25
Mushrooms, proteolytic enzymes from..	434
Mustard gas - see Gas, mustard	
Myoepithelium.....	986
Nerve(s)	
intercostal, fibre hyaline	
deposits in.....	88
pansacral, collagen disposition	
and glandular structure of....	81
sciatic, rabbit.....	106,891
Ninhydrin.....	971
Nitrogen	
amino.....	370
of collagen and wool.....	361,364
collagen, of dog tendon.....	287
content of	
skin, human.....	288
tendon, dog.....	287
Operation(s)	
pretanning.....	455
soaking.....	695
Ovary, rabbit, connective tissue of..	922

<u>Subject</u>	<u>Reference</u>
Pancreatin.....	436
action on collagen and gelatin..	467,468
Papain, papayotin.....	433
Pathology.....	106-111,113-117,119,122,123,126,127,135-142,144-147
Pattern(s)	
regeneration.....	119
x-ray diffraction of bone,	
tendons, and connective	
tissue.....	237
Pepsin.....	441,471,472,483,484
action on proteins.....	890
denatured.....	473
iso-electric precipitation of....	439
Peptide(s).....	750
Permeability, tissue.....	462
Phagocytosis.....	145
Phenol, combination with collagen...	417
Phenolformaldehyde, tanning	
properties of.....	952
Phenolnovolac, combination with	
collagen.....	417
Phenols, dihydric.....	944
Phormia regina larvae.....	128
Physical chemistry of cells and	
tissues.....	829
Physiology.....	112,118,120,121,124,125,128-134,143,148-155
Pickle(s)	
action on collagen.....	407,412,416
Pickling.....	706
Placenta	
collagen of.....	94
induced.....	154
Plexus, Auerbach's.....	82
Plumping of calfskin.....	712
Polymers, low-angle scattering in...	960
Potassium thiocyanate, effect on	
collagen and elastin.....	393
Pouch(es), pharyngeal.....	42
Powder, hide	
action of	
acids on.....	421,426a
papain and papayotin on.....	433
chrome tanned, hydrolysis of....	644
formaldehyde tanned.....	504
preparation of.....	343,345
swelling of.....	587-590,608-610
Pressure	
of colloids.....	834
osmotic.....	754,757,758

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Process(es)		Protein(s) - Continued	
dyeing.....	558	hide - continued	
liming.....	900	reaction with tetra-oxalato-	
setting.....	883	diol-chromiate.....	397
tanning.....	675	reactivity in its iso-	
chemistry of.....	675	electric zone.....	331
physico-chemical aspects of..	558	hydration of.....	219,842
theory of.....	595,596,611	hydroxy amino acids in.....	358
vegetable.....	552,897	hydroxylysine in.....	376
Procollagen.....	976	monamino acids of.....	374
Proline		industrial.....	847
determination of.....	354,371,745	insoluble, amino nitrogen of....	370
in gelatin.....	354	muscle,	
Properties		determination of.....	874
physico-mechanical of cellulose,		peptic digestion of.....	482
collagen, and rubber.....	546	natural, detection with pH	
tensile, of protein fibers.....	858	indicator.....	832
Protease(s)		reactivity of.....	822,823
Aspergillus oryzae.....	486	serum,	
bacterial.....	461	carbohydrate complex of.....	863
influence on swelling of		skin.....	301,373
collagen and fibrin.....	110	glucide content of.....	330
Protein(s).....	210,212,215,219,750	sorption of water vapor by.....	914
absorption of water vapor by....	813	structural, swelling of.....	419,420
action of		structure.....	359,842,862
bromine on.....	833	theory of colloidal behavior....	845
neutral salts on.....	875,876	x-ray analysis.....	959
pepsin and trypsin.....	890	see - X-ray analysis	
amino acid composition of.....	357	Proteinases, evaluation of.....	945
animal skin..	619,621-623,627,994,995	Proteolysis	
as colloidal electrolytes.....	837	measuring peptization in.....	487
chemistry of.....	828,835,843	of bone and cartilage.....	982
coagulable,		Protoplasm, submicroscopic	
histological study of.....	89,90	morphology of.....	925
combination with acids and		Pyloric caeca, cod and haddock,	
bases.....	623,836	enzymes from.....	449
corium.....	508		
denaturation of.....	219	Quill, porcupine	
determination of glycine in....	368	basic amino acid content of.....	811
egg shell.....	282	x-ray analysis of.....	225
electrophoresis of.....	544	Quinone, reactions with collagen....	526
estimation of serine and			
threonine in.....	369	Rabbit(s).....	303,891
fibrous, of mammalian epidermis..	160	ear, transparent chambers in....	1,9,
formaldehyde compounds.....	509	47,48,194,195	
heat denatured, reactivity of....	823	lymph node.....	30
hide,		nerves, sciatic,	
action of		collagen content of.....	106
glyoxal on.....	934	collagen formation in.....	891
salt on.....	399		
ultra-violet light on....	628		
effect of vegetable			
tannage on.....	935		

<u>Subject</u>	<u>Reference</u>
Rabbit(s) - Continued	
ovary.....	922
Radio-autography.....	894, 895
Rat(s)	
female, adrenal glands of.....	921
methionine deficient.....	898
Reaction(s)	
chemical, of tannage.....	320
histological for collagen.....	501
see also Histological technique	
paradoxic pallor.....	155
Reagent, Schiff, for staining	
reticulum.....	965
Reflections, Bragg.....	954
Refraction, double, in myelini.....	855
Reinnervation of rabbit sciatic	
nerves.....	891
Reticulin.....	168, 169, 171, 174, 192, 197, 246, 802, 1007
Reticulum.....	30, 178, 189
collagen, in cirrhosis.....	114
controlled formation of.....	151
lung.....	141
precollagen, in bilharzial	
cirrhosis.....	111
relation to collagen.....	154
skin.....	66
staining of.....	965
Rheumatism, fibrillar.....	144
Rings, Prenant's.....	95
Rodents, great omentum of.....	101
Rubber.....	229
physico-mechanical properties of.....	546
tension equilibria of.....	638
Salt(s)	
acid.....	409
action on	
collagen.....	426
gelatin solutions.....	770
hide protein.....	399
chromic.....	508, 519
chromium	
action on gelatin.....	771-773
aquo, reactions with	
collagen.....	512
copper, reaction with gelatin and	
gelatin hydrolysates.....	773
fixation by hide substance.....	506
inorganic, influence on collagen.....	582

<u>Subject</u>	<u>Reference</u>
Salt(s) - Continued	
iron.....	500, 519
neutral.....	452, 453
action on	
collagen solutions.....	130, 398, 488, 567
hide substance.....	412-415
proteins.....	875, 876
antagonistic action of.....	394
effect on	
boiling temperature of	
collagen.....	607
hide substance.....	430, 432
influence on	
gelatin.....	793
hydration of interstitial	
connective tissue.....	918
organic acid, in chrome	
tanning.....	517, 518
Sarcolemma, electron microscopy	
of.....	953, 1005
Sarcoma, Jensen.....	44
Sausage, collagen in.....	296
Scars, alveolar cell.....	126
Scattering, low angle in polymers.....	960
Scleroderma, diffuse.....	121, 896
Scleroproteins.....	807, 827, 850
amino acid content of.....	928
Sclerosis, alveolar.....	126
Sclerotica, collagen fibers of.....	56
Scorbutus, experimental.....	151, 153
Section(s)	
gross anatomical.....	997
tissue, electron microscopy	
of.....	926, 927
Selenium.....	710
Serine	
estimation in proteins.....	369
Set,	
permanent of animal	
fibers.....	878, 879, 883
Sheepskin, semi-tanned.....	648
Shell	
biochemical studies of.....	291
egg, proteins of.....	282
Shrinkage, incipient.....	978
Silk fibroin	
acetylation of.....	623, 854
methylation of.....	380
Skin(s).....	173, 820
animal	
chemical depilation of.....	683

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Skin(s) - Continued		Solution(s) - Continued	
animal - continued		alkaline, effect on hide	
coagulable proteins of.....	89,90	substance.....	412-415
fibers of.....	839	collagen.....	912
histology of.....	70	ethyl acetate, wattle-tannin in..	977
microbiology of.....	451	gelatin.....	754
removal of lime from.....	409	size distribution in.....	788
reticular tissue of.....	304	viscosity of.....	789
arginase in.....	968	protein, electrochemical	
bated histology of.....	91	properties of.....	821
biochemical studies of.....	291	tannin, effect on collagen	
biochemistry of.....	585	fibers.....	578
calf.....	228	Solvent(s)	
elastic tissue of.....	803	aqueous organic, tanning in.....	969
minimum plumping of.....	712	organic, protein fiber	
chemistry of.....	286,310	swelling in.....	844
coagulable proteins of.....	89,90	Specific gravity of skin and	
collagen derivatives of.....	553	vegetable tannin.....	873
collagen.....	66	Spectrometer, double crystal.....	954
cow, capillary distribution in..	924	Spines, Echidna, amino acids of.....	811
elastin of.....	66,138	Spongin, amino acids of.....	810
fish, histology of.....	402	Stability, hydrothermal.....	508,520
fundamental structure of.....	58	Stain	
glutin of.....	566	collagen, aniline blue.....	75,76,96
histochemistry of.....	99,100	combined elastics trichrome	
histology of.....	70	for tissues.....	79
human.....	288	selective, for collagen and	
hydrolysis of.....	848,849	reticular structures.....	75,96
oil tannage of.....	653-655	Strands, collagen.....	913
reticulin of.....	174	Streptococci, group A.....	974
reticulum.....	66	Structure(s)	
specific gravity of.....	873	connective tissue.....	162
stear.....	99	fibrillar, differentiation and	
study of.....	61	origin of.....	45
structure of.....	58	protein.....	206,207,209,211,769,809
swelling of.....	386	Substance(s)	
chemical basis for.....	585	amorphous, in connective tissue..	182
unlimed, action of trypsin on..	465	cellular.....	201
Soda, caustic, action on human hair..	886	cementing.....	916,917
Sodium		collagenous.....	126
fluosilicate.....	645	elastic, in tissue cultures.....	185
hydroxide, titration curve of		fibrillar.....	177
collagen.....	400	ground.....	203
periodate, acidified, in		see Substance, cementing	
reticulum staining.....	965	intercellular.....	158
Solids, macromolecular.....	238	hide.....	353
Sols, gelatin.....	789-791	action of acids on.....	411
Solubles, water, leather.....	663	antagonistic action of	
Solubility of collagen in dilute		neutral salts on.....	394
acids.....	133	effect of neutral salts.....	430
Solution(s)		fixation of chromium salts	
acid, hide powder swelling		by.....	506
in.....	426a,587	iron salts by.....	541

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Substance(s) - Continued		Tannin(s)	
hide - continued		catechin.....	310
losses during soaking.....	695	determination of.....	697
reaction with		lignosulfonate.....	522
ligno sulfonic acid..	510, 511	synthetic.....	417
basic aluminum sulfate..	543	vegetable in aqueous organic	
basic chrome sulfate.....	554	solvents.....	969
high molecular.....	877	specific gravity of.....	873
intercellular.....	151-153, 198	wattle, in ethyl acetate	
interstitial.....	170, 201	solutions.....	977
organic		wattle-bark, combination with	
magnetic anistropy of.....	814	collagen.....	527, 604
hydrophyllic groups of..	581, 584	Tanning	
radioactive, action on colloids..	846	chemical and physiological	
Sulfato-hydroxy-chromi, collagen		aspects of.....	666
compound.....	395	chemistry of.....	596
Sulfides, effect on alkaline hydrolysis		chrome.....	499, 500, 502-505,
of hair and skin.....	849	517, 518, 520, 521, 532, 533,	
Suppurations, subcutaneous.....	14	538, 540, 595, 596, 705, 707, 708	
Surfaces, cell, chemistry of.....	544	combined, chemical processes of..	698
Suspensions, histological, behavior		electronic theory of.....	633, 634
in supersonic field.....	268	formaldehyde.....	495-498, 501,
Sutures, collagen, enzyme digestion		513-516, 529,	
of.....	481	534, 536, 537, 539	
Syncyticem, connective tissue.....	176	mechanism of.....	949
Syntans, bonding with collagen.....	961	mineral.....	682
System(s)		theory of.....	549-551, 633, 634, 703
biological, fine structure of...	267	vegetable....	535, 542, 595, 596, 632, 893
collagen,		zirconium.....	530
diseases of.....	958	Tantalum oxide in wound healing.....	911
HCl equilibrium in.....	643	Technique	
lattice fiber.....	254	pathological.....	77
protein, donnan equilibria and		tanning.....	671
molecular effects in.....	396	Teeth	
reticular.....	92	electron microscopy of.....	990
Tampons, collagen.....	113	tissue elements of.....	172
Tannage		Temperature, shrinkage..	545, 552, 561, 620,
aldehyde.....	704	621, 962, 963, 966	
basic chrome sulfate.....	523-525	of formaldehyde tanned leather...	704
chrome.....	996	significance of	
formaldehyde.....	996	practical.....	619, 621
iron.....	519	theoretical.....	627
vegetable.....	998	Tenablasts.....	21
chromium acetate.....	705	Tendon(s).....	237, 241, 243, 571
formaldehyde chrome.....	996	Achilles, chemical constituents	
mineral.....	771-773	of.....	314
oil.....	653-655	collagen fibers of.....	57
quinone.....	700	dog.....	287
vegetable.....	935	formaldehyde tanned.....	241
zirconium.....	530	fowl embryo.....	21
		graphs of.....	33
		heat contraction of.....	241
		reversible crystallization in...	557

<u>Subject</u>	<u>Reference</u>	<u>Subject</u>	<u>Reference</u>
Tendon(s) - Continued		Tissue(s) - Continued	
tail, kangaroo.....	261	connective - continued	
Tetra-oxalato-diol-chromiate, reaction		inflammatory, regeneration	
with hide protein.....	397	in.....	179
Theory, Fischer, M. H. for acid		interference and Brownian	
formation in edema.....	613	movement in.....	247
Thermodynamics.....	636, 637, 639	interstitial.....	915-919
Thiocyanates		lesions of endometrium.....	122
influence on shrinkage of		liver.....	293
collagen.....	582	loose, intercellular ground	
potassium, effect on collagen		substance of.....	158
and elastin.....	393	pathology of collagen	
Thioglutin.....	866, 867	degeneration of.....	146
Threonine		physiology of.....	164, 166
content of meats.....	930	reprecipitated, x-ray	
estimation in proteins.....	369	diffraction pattern of...280	
Thrombus collagen formation in.....	109	reticular.....	165
Thymonucleohistone, affected by		spread of fluids in.....	919
ascorbic acid and hydrogen		subcutaneous.....	182, 183, 190
peroxide.....	143	syncytium.....	176
Tissue(s)		thermodynamic	
animal, properties of.....	149	considerations.....	148, 149
cicatricial.....	14	water binding in.....	171
collagen		regeneration.....	179
effect of liming on.....	425	x-ray diffraction patterns	
chrome tanned, influence of		of.....	237
fat-liquoring on properties		yellow fibrous.....	201
of.....	528	contractile, of mammary gland....986	
thermodynamics of acid and		contractility.....	264
alkali contraction of....636		culture(s).....4, 7, 11, 15, 16, 19-24,	
collagenic, connective in wounds.136		26-28, 30, 31, 36-41,	
collagenous, method for		43-46, 49, 52-54, 185	
staining.....	75, 997	dorsal chord.....	93
colloids.....	12	elastic, electron microscopy of..932	
combined elastics-trichroms		embedded, surface staining of....60	
stain for.....	79	eye, distribution of Lewisite	
connective.....11, 14, 20, 23, 27, 29, 31,		in.....	895
32, 46, 105, 122, 136, 144, 146,		fibrous	
148, 154, 157, 158, 161, 162-167,		development in peritoneal	
169, 171, 175-177, 179-183, 186,		adhesions.....	117
187, 190, 193-196, 198, 199, 202,		origin and structure in	
921, 922		wound healing.....	3
chemical and electrical		swelling of, histological and	
properties of.....	337	physico-chemical	
chemistry of.....	980	investigation.....	68
cultures of.....	11, 27, 31	fine structure of.....	264, 266
development of.....	176, 193-195	firmness of.....	264
elastic and thermodynamic		granulation, tissue cultures in..15	
properties of.....	148, 149	human.....	259
fiber development in..23, 161, 162		injured, vitamin C and repair of...5	
growth in vitro.....	46	living, method of studying.....1, 9,	
human, swelling measurements		47, 48, 194, 195	
on.....	613	mesenchymal.....	45

<u>Subject</u>	<u>Reference</u>
Tissue(s) - Continued	
muscular, striated.....	136
non-tendonous, properties of	
collagen fibers of.....	57
normal, collagen and elastin	
content.....	304
physical chemistry of.....	829
reticular.....	804
of skin.....	173
distribution of	
Lewisite in.....	895
Toxins, gas-gangrene, see K-toxin	
Toxemia, gas-gangrene.....	127
Transparent	
chambers, see Chambers, transparent	
Trypsin.....	435, 443, 444, 446, 460, 464, 465, 488, 489
action on	
diverse leathers.....	709
proteins heated in fat or	
oil.....	890
effect on collagen.....	938
tanned collagen.....	637
Tumors.....	32, 987
Turtle scutes.....	810
Tyrosine, color reaction for.....	360
Urea, depilatory action.....	943
Uterus, structural differences of	
non-pregnant and pregnant.....	102
Vein(s), collagen fiber arrangement	
in.....	64
Vertebrate(s)	
mesostroma, mesenchyme and	
connective tissue of.....	196
microscopic anatomy of.....	956
Vitamin C	
see Ascorbic acid	
Wallerian degeneration.....	106, 891
Walls arterial, collagen in.....	98
Water	
content of skin.....	288
fixation by collagen and chrome	
tanned leather.....	562

<u>Subject</u>	<u>Reference</u>
Water - Continued	
in dog tendons.....	287
vapor	
absorption by proteins.....	813
adsorption by	
collagen and elastin.....	929
hide and leather.....	955
Wattles, cock.....	155
Weight, micellar.....	754, 757, 758
Wetwork, tannery.....	557
Wool.....	220, 221, 271, 769, 854, 957
acetylation of.....	380
amino acid composition of.....	812
amino nitrogen content of....	361, 364
methylation of.....	380
Wound(s) /wound healing, repair of	
injured tissues.....	3-5, 10, 12-14, 136
X-ray analysis..	204-230, 232-234, 236-238, 240-242, 245, 246, 248-253, 256-261, 263, 271-273, 280
in biology and medicine.....	992
Zirconium tannage.....	530

