AN INDEX TO THE LITERATURE OF STEREOCHEMISTRY,

WITH A NOTE ON THE STEREOCHEMISTRY OF CREATININES.

By Dr. Arnold Eiloart.

In compiling this index I have been much indebted to the numerous references in Van't Hoff-Meyerhoffer's "Stereochemie," most of which, with amplifications and some corrections, are incorporated here; also to the bibliography, by Prof. Warder, of which I have made free use. To Dr. Henry Carrington Bolton my thanks are due for valuable advice as well as for bibliographical data; in particular for calling my attention to Swedenborg's contribution to stereochemistry.

PLAN OF INDEX.

The bibliography of this subject published two years ago by Warder having been classified according to subjects, I have arranged the present list in the order of the authors' names, hoping that thus the maximum benefit may accrue from the existence of both indexes, which may be used together. But in order that this index may be capable of independent use as a guide to the literature of any given branch of the subject a symbol is prefixed to each paper, excepting only those of scope too wide to admit of such brief indication of their subject matter. A list of symbols precedes the list of papers.

For clearness, only the main subject of each paper has been in-

dicated by a symbol; thus a paper marked ⬡ may treat not only of ring-configurations but of rings containing an asymmetric carbon-atom (C); yet if ring-configuration is the main subject, the symbol C will not appear.

Whether or not a paper on optical activity bears mainly on the question of the asymmetric carbon-atom is often difficult to decide. For most cases I have settled the question by marking with C only papers which were printed after those of Van't Hoff and Le Bel in 1874. In doing this I have simply accepted as a separate epoch the period which these chemists made such by their work. Earlier papers on the action of substances on polarized light are marked L for "Light."

As the great bulk of stereochemical investigation has been massed together in point of time, a chronological index seemed useless; on the other hand many a reader may wish to consult the literature of a particular period or to see at a glance the general chronological distribution of the literature; the few lines necessary to satisfy such readers have therefore been added in the form of a classification of publications into periods.

Finally, since a specially helpful form of guidance consists in information as to other guides, and since so many must make compactness and not originality the criterion of what they shall read, a list of reviews of the main subject and of its chief branches is given.

LIST OF SYMBOLS AND CONTRACTIONS.

C = stereochemistry of carbon.

C = asymmetric carbon.

$\overset{C}{|}$ for $\overset{C}{|}$ = ethane derivatives.

$\overset{C}{||}$ for $\overset{C}{||}$ = ethylene derivatives.

 = "Cis-trans" isomers.

 = Benzene and derived rings.

L = Action on polarized light.

N = Nitrogen except pentavalent nitrogen.

N^{v} = Pentavalent nitrogen.

Ann. = Ann. Chem. (Liebig.)

Ber. = Ber. d. Chem. Ges.

R. = My review of Stereochemistry.[1]

The figures following R indicate the page or pages of the review on which the reference or references preceding R, and placed in parenthesis with it, are given. This affords a ready means of gaining some idea of the contents of the papers so bracketed.

[1] About to appear independently with this index as an appendix.

LIST OF PUBLICATIONS.[1]

1. | Alexander, H.—1888. Ann. **248,** 281. Phenylmalic acids.
2. C Anschütz, R.—1887. Ber. **18,** 1949. The number of inactive malic acids.
   || 1887. Am. Chem. J. **9,** 253; Chem. Ztg. **11,** 1212; Ann. **239,** 161.—1889. (Ann. **254,** 168.—R. 20). Fumaric and maleïc acids.—1890. (Ann. **259,** 145—R. 31).
   | " and Bendix, P.—1890 Ann. **259,** 61. Diphenylsuccinnic acids. Relationship probably same as between the hydrobenzoïns.
   C " and Hintze, C.—1885, Ber. **18,** 1394. Attempt to "double" oxalic acid.
   1887. Ann. **239,** 164. Attempt to "double" fumaric acid.
   || " and Selden, Ch. C.—1887 Am. Chem. J. **9,** 379; Ber. **20,** 1382. Monobromcinnamic acids.
3. C Antrick, O.—1887. Ber. **20,** 310. Cocaïne.
4.  Armstrong, H. E.—1887 (J. Chem. Soc. **51,** 264.—R. 14).
   || 1888. Ibid. Proc. **54,** 93 (Ref. Chem. News **58,** 240). Plane and axial symmetry.
    1892. Chem. News **65,** 285. New structural formulæ suggested for acids supposed to be stereomeric.[2]

[1] In several instances the references to the *Berichte* given in this index differ from those in the *Berichte* indexes, which contain numerous errors; some of them really *recherchés*.

[2] This word, introduced by Van't Hoff-Meyerhoffer, is used instead of the awkward "stereo-isomeric."

5. || Aronstein, L., and Hollemann, A. F.—1889 Ber. **22,** 481. Addition of H to acetylene compounds.

6. — Ashe, Isaac.—1889. Chem. News **60,** 235. Forms of Atoms.

7. — Aubin, Ch. See Graebe, C.

8. || Autenrieth, W.—1887. Ber. **20,** 1531. Thiophenylcrotonic acids. (E. Baumann's laboratory.)

9. Auwers, K.—1890. "Die Entwicklung der Stereochemie. Theoretische und experimentelle Studien." Heidelberg : C. Winter, pp. 157.

N 1890. Ber. **23,** 399.

| 1891. Ber. 24, 1776. Hydrobenzoïns.

1890 and '91. Ber. **23,** 1600; **24,** 4012. Dimethylglutaric acids.

N " and Dittrich, M.—1889. Ber. **22,** 1996. Structure of benziloximes.

| " and Jackson, Louis L.—1890. Ber. **23,** 1599. Bischoff's dynamic isomerism.

| " and Köbner, E.—1891. Ber. **24,** 1923. Symm. dimethylglutaric acids, etc.

N " and Meyer, V.—1888. Ber. **21,** 784, 3510. Two benzildioximes.

1889. Ber. **22,** 537. Two benzilmonoximes. Ber. **22,** 564. Structural identity of benzilmonoximes.—Ber. **22,** 705. The third benzildioxime.—Ber. **22,** 1985. No isomeric oximes of phenanthraquinone.

| Ber. **22,** 2011. Tetramethylsuccinic acids. Ber. **22**, 3005. Dibasic acids, $C_8H_{14}O_4$.

— Naturwiss. Rundschau **4,** 477–481. Present state of stereo-chemical investigation. (Ref. Chem. Centrbl. [4] **1,** II., 668.

| 1890. Ber. **23,** 101. Formation of anhydrides of acids of succinic series. Facilitated by presence of alkyls.

N Auwers, K., and Meyer, V.—(Ber. **23,** 2063.—R. 43.) Oximes of halogenised benzophenones.—(Ber. **23,** 2403.—R. 44.) Configuration of hydroxylamine.

| (Ber. **23,** 2079.—R. 25.) Ethane derivatives.

N 1891. (Ber. **24,** 3267.—R. 47.) Oximes. Answer to Claus.

Ber. **24,** 4225.—R. 44. Isomeric hydrazones.

N " and Siegfeld, M.—1892. Ber. **25**, 2597. Benziloximes. Testing structural identity.

— Auwers, K. See Fehrlin, H. C.

— " " Krause, A.

— " " Meyer, V.

10. — Bachmeyer, W.—1886. Chem. Centrbl. [3] **16,** 209. Molecular spheres and molecular structure.

11. II Bader, R.—1890. Ztschr. phys. Chem., **6,** 289 (espec. p. 315). Affinity constants.

12. Baeyer, A. von.—1870. Ann. Supp. **7,** 1. Mellithic acid.

— 1885. Ber. **18,** 674, (2269.—R. 10). Polyacetylene compounds. (See especially p. 2278.)

1886–'91. Ber. **19,** 1797; (**23,** 1272.—R. 10). Ann. **245,** 103; **251,** 257; **256,** 1; **258,** 1, 145; **266,** 169. Constitution of benzene.[1] (R. 14, 26.)

1888. Ann. **246**, 383. Note on L. Meyer's Benzene formula.

1892. Ann. **269,** 145. Constitution of benzene.

13. N Baker, H. B.—1882. Chem. News, **48,** 187. Nitrogen and hydrogen said not to combine in presence of spongy platinum. (But see Johnson, G. S.)

14. Bamberger, E.—1890. (Ann. **257,** 1; J. prakt. Chem. [2] **42,** 188.—R. 14, 15.)

C Ber. **23,** 291. "Doubling" of ac. 1, 5, tetrahydronaphthalene diamine.

15. II Bandrowski, E.—1879. (Ber. **12,** 2212.—R. 18.)

[1] A special connection between para-atoms (Claus' formula), said to exist side by side with the general central connection among all six atoms.

16. — Barbieri, J. See Schulze, E.

17. C Baumann, E.—1882. Ber. **15,** 1731. Cystine derivatives. Activity and C disappear together.

" See also Autenrieth, W.

——— and Fromm, E.—1891. (Ber. **24,** 1419.—R.15).

18. N Beckmann, E.—1887–'90. (Ber. **20,** 2766; **22,** 429, 514, 1531, 1588; **23,** 1680, 3319, 3331.—R. 43.) Benzaldoximes.

1889. Ann. **250,** 322. Camphor series. (Theory, pp. 360–375.)

— " See Günther, E.

— " See Pleissner, M.

19. — Beckurts, H.—See Otto, R.

20. N Behrend, R.—1890. (Ber. **23,** 454, 1776—R. 38, 45.) N-poles.

" and König, E.—1890. Ber. **23,** 2750. Two isomeric paranitrobenzylbenzaldoximes.

" and Leuchs, K.—1889–'90. Ber. **22,** 384, 613; Ann. **252,** 44; **257,** 203. Hydroxylamine derivatives.

" and Nissen, Detlev.—1892. Ann. **269,** 390. O-chlorbenzaldoximes.

21. C Beilstein, F., and Wiegand, E.—1883. Ber. **17,** 2261. Tiglic and angelic acids.

22. — Bendix, P. See Anschütz, R.

23. C Berthelot, D.—1875. (Bull. Soc. chim. (Paris) [2], **23,** 338.—R. 49.)–1876 and 1878. Comptes rend. **82,** 441, **85,** 1181. Styrolene said to be optically active. Compare Hoff, J. H. van't, also Krakau.

24. — Besredka, A. See Zelinsky, N.

25. | Bethmann, H. G.—1890. (Ztschr. phys. Chem. **5,** 385—R. 25, 28.)

26. L Biot, J. B.—1817. Mém. de l'Académie de Paris[1] **2** 41 (especially pp. 114 *et seq.*). Turpentine vapor optically active.

[1] The date is a better guide than the volume, as the series seem to be confused.

L Biot, J. B.—1818. Ibid **13,** 144(?).[1] Ann. chim. phys. [2] **9,** 372.

1819. Ann. chim. phys., **10,** 63. Optical activity of various substances.

1835. Ibid. **13,** 39. Applications to organic chemistry.

1838. Ibid. **15,** 93. Optical activity of mixtures and combinations.

1838. Ibid. **69,** 22. Polarized light shows difference between isomers.

1839. Comptes rend., **9,** 621. Activity of camphor.—Ibid. **9,** 825. Turpentine. (Comp. Deville.)

1844. Ann. chim. phys. [3] **10,** 5, 175, 307, 385; **11,** 82. Use of polarized light for studying chemical mechanics.

1849-'50. Comptes rend., **27,** 461; **29,** 433; **31,** 601. Reports on Pasteur's work on the tartaric acids.—Ibid. **28,** 321: Camphoric acid (comp. Bouchardat).—Ibid. **29,** 681; Ann. chim. phys. [3] **28,** 215, 351. Rotation by solids.—Comptes rend., **30,** 721; Ann. chim. phys., **29,** 135, 341. Tartaric acids.

Comptes rend. **31,** 101. Ann. chim. phys., **29,** 430. Laws of variation of rotatory power.

1852. Comptes rend. **33,** 549. Report on Pasteur's paper in Ann. chim. phys. [3] **34,** 30.

27. | Bischoff, C. A.—1886-'87. Ber. **19,** 95; **20,** 2988. Substituted succinic acids.

1888. Ber. **21,** 2071 (especially p. 2074). Nitrostilbenes.—Ber. **21,** 2102. Symm. diethylsuccinic acids; especially pp. 2105 *et seq.*

See note on last page.

N Bischoff, C. A.—1889. Ber. **22,** 1774, 1792, 1809. Piperazines and derivatives.

| 1889–'90. Ber. **22,** 3179; **23,** 13. Substituted succinic acids.

|| 1890. (Ber. **23,** 1924—R. 21.)

N (Ber. **23,** 1967—R. 47.) Ber. **23,** 1972. Piperazine group.

| (Ber. **23,** 620, 623, 1464, 3414; **24,** 1041, 1050, 1064, 1074, 1085, 2001.—R. 26, 30-34.) Dynamic isomerism.

1891. Ber. **24,** 2083. Substituted succinic acids.

N " and Hausdörfer, A.—1890. Ber. **23,** 1981, 1987, 1991, 1997, 2003. Piperazine derivatives.

| " and Hjelt, E.—1887 and 1888. Ber. **20,** 2988, 3078; **21,** 2089, 2097, 2102; **22,** 67; **23,** 650. Substituted succinic acids.

| " and Kuhlberg, A. von.—1890. Ber. **23,** 634, 1942. Substituted succinic acids.

| " and Mintz, N.—1890. Ber. **23,** 647, 653, 656, 3410. Substituted succinic acids.

| " and Nastvogel, O.—1889. Ber. **22,** 1783, 1786, 1804.

N 1890. Ber. **23,** 2026, 2031, 2035, 2040, 2047, 2051. Piperazine derivatives.—Ber. **23,** 2055. Attempts to prepare rings containing two nitrogen and two, three or six carbon atoms.

| " and Rach, C.—1885–'86. Ber. **18,** 1202; Ann. **234,** 54 (especially p. 86). Symm. dimethylsuccinic acid.

N " and Trapesonzjanz, Ch.—1890. Ber. **23,** 1977. Diphenylpiperazine.

| " and Voit, E.—1889–'90. Ber. **22,** 389; **23,** 639, 644. Symm. dimethylsuccinic acids.

| " and Walden, P.—1889. Ber. **22,** 1812, 1819. Disubstituted succinic acids.

| Bischoff, C. A., and Walden, P.—1890. (Ber. **23**, 1950. —R. 7.)

28. II Blank, A.—1888. (Ann. **248**, 1.—R. 24.) Members of the stilbene group. (Communicated by Wislicenus, J.) Compare Eiloart, A., and Redzko, W. G.

29. II Bleibtreu, H.—1846. Ann. **59**, 183. Cumaric acid.

30. C Börnstein, E., and Herzfeld, Al.—1885. Ber. **18**, 3353. Trioxybutyric acid.

31. — Boltzmann, L.—1889. Verein deutsch. Naturforscher, Sept. 21. (Ref. Chem. Centrbl. [4] **1**, II, 677.) Relation between size of molecule and space occupied by the valences.

32. — Bosshard, E. See Schulze, E.

33. L Bouchardat, G.—1843. Ann. chim. phys. [3] **9**, 213. Optical activity of alkaloids.

1844-'45. Comptes rend. **18**, 298; **20**, 1635. Optical activity of salicine, etc.—Ibid. **19**, 601, 1174. Amygdaline and amygdalic acid.

1849. Comptes rend. **28**, 319. Camphoric acid. Comp. Biot.

1872. Ibid **74**, 665. Dulcite derivatives.

C " and Lafont.—1887. Comptes rend. **105**, 1177. Borneols.

34. N Braun, E.—1889. Ber. **22**, 557. Benzilmonoxime.

35. — Brown, F. D.—1881. Chem. News, 44, 195. Affinity and valence.

36. — Browne, G. M. See Michael, A.

37. — Bredig, G. See Will, W.

38. C Bremer, G. J. W.—1880. Ber. **13**, 351. Recueil trav. Chim. **4**, 180. "Doubling" of malic acid.

1885. Ibid. **6**, 255. Effect of different solvents on specific rotation.

C " and Hoff, J. H. van't—1876. Ber. **9**, 215. Optical activity disappears with C.

39. || Bruck, P.—1891. Ber. **24**, 4118. Addition of iodine to unsaturated acids.
1892. Ber. **25**, 503. Correction of above.

40. || Brühl, J. W.—1881. Ber. **14**, 2742. Citraconic and mesaconic acids.

1887. Ztschr. phys. Chem. **1**, 307; Ber. **20**, 2288. Refractive power and constitution of benzene and naphthalene compounds.

— 1892. Ber. **25**, 1952. Trimethylene. Strain-theory.

41.  Buchner, E., and Dessauer, H.—1892. Ber. **25**, 1147. Carboxyl derivatives of phenyltrimethylene.

42. — Buchstab, L. See Zelinsky, N.

43. N Burch, G. J. and Marsh, J. E.—1889. (J. Chem. Soc., **55**, 656.—R. 40.)

44. — Caberti, L. See Minunni, G.

45. — Carnelley, T.—1882. Phil. Mag. [5], **13**, 112, 180. Influence of atomic arrangement on the physical properties of substances.

46. | Chalanay, L., and Knoevenagel, E.—1892. Ber. **25**, 289. Stereomeric diphenylsuccinic nitriles.

47. L Chancel, G.—1869. Comptes rend. **68**, 659, 726. Propyl alcohol said to be active; but see Henninger, A.

48. L Chautard, J.—Jsb. Chem. 1863, 556. The two camphoric acids.

49. || Ciamician, G.—1888. Ber. **21**, 1621. Apiol and isapiol.

C " and Magnanini, G.—1886. Gazz. chim. **16**, 390. Two tetrabromides of piperylene.
1888. Ber. **21**, 1434.

" and Silber, P.—1887. Ber. **20**, 2594. Formation of maleïc acid from pyrrol derivatives.

50. — Clarke, F. W.—1875. Am. Chemist, **6**, 81; Proc. A. A. A. S., **24**, 99. Chemistry of three dimensions.

51. — Claus, Ad.—1867. "Theoretische Betrachtungen und deren Anwendung zur Systematik der organischen Chemie." Freiburg.

Claus, Ad.—1882. Ber. **15,** 1405.
1887. Ber. **20,** 1422.
1888–'89. J. prakt. Chem. [2] **37,** 455 (**40,** 69; **42,** 24. 260.—R. 14). Constitution of benzene
N 1891–'92. (Ibid. [2] **44,** 312; **45,** 1, 377.—R. 47.) Oximes.
1892. Ibid [2] **45,** 556. V. Meyer and the oximes. Ibid **46,** 474. Oximes.

52. — Cloez, Ch. See Grimaux, E.

53. C Colson, A.—1892. Comptes rend. **114,** 175. Diacetyltartaric acid.—Ibid. **114,** 417. Answer to Le Bel's paper on the above, *q. v.*

53*a*.— Corselli, G. See Minunni, G.

54. N Cramer, C.—1891. Ber. **24,** 1198. Monoximes of succinic acid.
1892. Oximidoacetic acid, etc. (Hantzsch's laboratory.)

55. — Curtiss, R. S. See Fischer, E.

56. — Debout, C. See Faworsky, Al.

57. C Deichmüller, A., Szymanski, F., and Tollens, B.—1885. Ann. **228,** 95. Optical activity disappears with C.

58. II Delalande, Z.—1843. Ann. **45,** 334. Cumaric acid.

59. II Delisle, A.—1891. Ber. **24,** 3620.
1892. Ann. **269,** 72. Transformation of unsaturated acids into their stereomers.

60. N Demuth, R., and Dittrich, M.—1891. Ber. **24,** 3609. Oximes of halogenised benzophenones.
| " and Meyer, V.—1888. Ber. **21,** 264. Isodibromsuccinic acid.

61. — Dessauer, H. See Buchner, E.

62. — Deventer, Ch. M. van. See Hoff, J. H. van't.

63. L Deville.—1839. Comptes rend. **9,** 824. Optical activity of chlorinated turpentine.

64. — Dittrich, M. See Auwers, K.
— " See Demuth, R.

65. N Dollfus, W.—1892. Ber. **25,** 1908, 1926. Oximes. Hantzsch's laboratory.

66. N Dunstan, W. R., and Dymond, T. S.—1892. J. Chem. Soc., **61**, 470. Two acetaldoximes.

67. — Dymond, T. S. See Dunstan, W. R.

68. C Easterfield, T. H.—1891. (J. Chem. Soc., **59**, 71.—R. 6.)

69. II Ebert, G.—1882. Ann. **216**, 139; especially p. 142.
1884. Ann. **226**, 347; especially p. 353. Coumaric acid derivatives. (Fittig's laboratory.) Compare Perkin, W. H.

70. II Eiloart, A.—1890. (Am. Chem. J., **12**, 231.—R. 24.) Chlorine compounds of tolane (Wislicenus' laboratory). Compare Blank, A., and Redzko, W. G.—(J. prakt. Chem. [2] **43**,
| 124.—R. 25.) Relative rotation of carbon atoms.
— 1891. Am. Chem. J., **13**, 559. Solid formulæ; models.

71. C Einhorn, A.—1889. Ber. **22**, 1495. Ecgonin, etc,
1890. Ber. **23**, 979. Dextro-cocaïne and homologues.

72. C " and Marquart, A.—1890. Ber. **23**, 468. Dextro-cocaïne.

73. C Engel.—1888. Comptes rend., **106**, 1734. Aspartic acid doubled.

74. II Erdmann, O.—1890. Ann. **258**, 130. Benzalævulinic acids.

75. II Erlenmeyer, E.—1886. Ber. **19**, 1936. Cinnamic acid series.
1890. Ber. **23**, 3130. Conversion of cinnamic into isocinnamic acid.
C " and Hell, C.—1871. Ann. **160**, 257. Leucine said to be inactive.
II " and Stockmeier, H.—1886. Ber. **19**, 1936. Cinnamic acid derivatives.

76. C Erlenmeyer, E., Jr.—1891. Ber. **24**, 2830. Phenylbromlactic acids and phenoxyacrylic acids.

77. N Ernst, W. H. See Goldschmidt, H.

78. | Evans, W. P.—1891. (Ztschr. phys. Chem., **7**, 337.—R. 28.) (Naumann's laboratory.)

79. H Faworsky, Al., and Debout, C.—1890. J. prakt. Chem. (**42**, 149.—R. 23.) Bromine derivatives of pseudobutylene.

80. I N Fehrlin, H. C.—1889. Ber. **22**, 553. Bidesyls.
1890. (Ber. **23**, 1574.—R. 45.) Isomeric hydrazones of o-nitrophenylglycollic acids. (Laboratory of Anwers and Meyer.)

81. C Fischer, E.—1884, '88 and '89. Ber. **17**, 579; **21**, 988, 2631; **22**, 87. Phenylhydrazine compounds with sugars, Pts. I, III, IV and V. For Pt. II, see Fischer and Steche, A.
1889. Verein deutsch. Naturforscher, Sept. 19th and 22d. (Ref. Chem. Centrbl. [4] **1**, II, 672.)
1890. Ber. **23**, 370. Syntheses. Mannonic acid "doubled" (p. 379).—Ib. 799. Synthesis of grape sugar.—Ibid 2114. Lecture on syntheses in the sugar group, with bibliography.—Ibid 2611. Optical isomers of glucose, etc.—Ibid 2625. Acids of the sugar group.—Ibid 3684. Reduction of fruit sugar.
1891. Ber. **24**, 1836, 2683. Configuration of glucose and its isomers (Ref. Am. Chem. J., **14**, 399).—Ber. **24**, 2136, 3622. New isomer of mucic acid.
1892. Ann. **270**, 64. Sugars from glucose with more than six carbon-atoms.

C " and Curtiss, R. S.—1892. Ber. **25**, 1025. Gulonic acids.

C " and Hertz, J.—1892. Ber. **25**, 1247. Mucic acid.

C " and Hirschberger, J.—1888 and '89. Ber. **21**, 1805; **22**, 365, 1155, 3218. Mannose.

C and Meyer, J.—1889. Ber. **22**, 361, 1941. Oxidation of milk-sugar and of maltose.

C " and Passmore, F.—1889. Ber. **22**, 359.
1890. Ber. **23**, 2226. Sugar.

C Fischer, E., and Piloty, O.—1891. Ber. **24,** 4214. The second inactive trioxyglutaric acid.

C " and Stahel, R.—1891. Ber. **24,** 528. Xylose. —Ibid 539: Mannosaccharic acid.—Ibid 2144: Sorbite.

C " and Steche, A.—1887. Ber. **20,** 821. Phenylhydrazine compounds with sugars, Pt. II.

C " and Tafel, J.—1887–'89. Ber. **20,** 2566, 3384; **22,** 97. Synthetic experiments in the sugar group.

1888. Ber. **21,** 1657, 2173. Isodulcite.

82. — Fittica, F.—1888. (Jsb. Chem., 1888, p. 87.—R. 49.)

83. Il Fittig, R.—1877–'84. Ann. **188,** 42, 95; **195,** 56; **200,** 21; **206,** 1; **208,** 37, 111; **216,** 26.

1889–'92. Ann. **255,** 1, 275; **256,** 50 (**259,** 1. —R. 23); **267,** 218; **268,** 1; **269,** 1; Ber. **24,** 82. Unsaturated acids.

84. N Franchimont, —.—1892. Versl. en Mededell Akad. Amsterdam. A second acetaldoxime. (See Dunstan and Dymond.)

85. C Fock, A.—1891. Chem. Ztg., **20,** 76. Crystalline form and chemical composition. (Ber. **24,** 101. —R. 5.)

86. — Freer, P. See Michael, A.

87. Friedel, C.—1891. (Bull. Soc. chim. (Paris) [3] **5,** 130.—R. 15.)

88. C Friedländer, P.—1890. Ber. **23,** 572. Models. Communicated by V. Meyer.

89. N Friedländer, S.—1857. J. prakt. Chem., **70,** 449. Trimethylethylstibonium iodide said to be dextro-rotatory[1] (p. 451).

90. Il Friedrich, R.—1883. Ann. **219,** 322, 368. Halogenised crotonic acids; especially p. 362.

91. — Fromm, E. See Baumann, E.

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[1] Watts' Dictionary (1863), citing Friedländer, calls the salt lævo-rotatory, and this is repeated in the edition of 1888, although Le Bel had stated in 1877 that it is inactive.

92. | Garrett, J. C.—1888. Ber. **21**, 3107.

93. N Gattermann, L.—1890. Ber. **23**, 1733. Isomerism of certain nitrogen compounds.

N " and Ritschke, A.—1890. Ber. **23**, 1738.

94. — Gaudin, Marc-Antoine.—1873. "L'Architecture du Monde des Atomes," Paris, 1873. Gauthier-Villars, pp. xix+231. Compare West.

95. C Gernez, D.—1864. Ann. scient. de l'Ecole normale sup. **1**, 1. Optical activity of turpentine and camphor vapors.

96. — Giesel, F. See Liebermann, C.

97. N Goldschmidt, H.—1889 and '90. (Ber. **22**, 3101; **23**, 2163, 2746.—R. 43.) **23**, 3113. Benzaldoximes are structurally identical.

98. N " and Ernst, H. W.—1890. Ber. **23**, 2170. Oximes.

99. N " and Kisser.—1887. Ber. **20**, 2071. Carvoximes.

N " and Kjellin, C.—1891. Ber. **24**, 2547. P-nitrobenzaldoximes.

100. C Goldschmiedt, G.—1888. Sitz. Ber. Akad. Wien, January; Monatsh. Chem., **9**, 42. (Ref. Ber. 240. Papaverine.)

101. | Graebe, C.—1887. Ber. **20**, 848. Diphenic acids. Formulæ.

1890. (Ber. **23**, 1344.—R. 26.) Benzilorthocarboxylic acid (especially p. 1347).

| " and Aubin, Ch.—1887. Ber. **20**, 845, 848. Diphenic acids.

| " and Juillard, P.—1887. Ann. **242**, 214. Diphthalic acids.

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$$\begin{array}{c} C_6H_5COCOC_6H_5 \\ \| \\ C_6H_5COCOC_6H_5 \end{array}$$

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1887. Ber. **20**, 1189. Sugars.

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329. N Willgerodt, C.—1888 and 1890. (J. prakt. Chem. [2] **37,** 449 ; **41,** 291, 526 ; **42,** 63.—R. 39.)
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1886. Ann. chim. phys. [6] **8,** 340. Reusch's active piles.—Ibid. **9,** 221. "Doubling" racemates.

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CHRONOLOGICAL CLASSIFICATION OF PUBLICATIONS.

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Second Period. 1800 to 1873 inclusive.

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*Von Baeyer began to develop Van't Hoff's theory in 1885, Wislicenus' in 1886.

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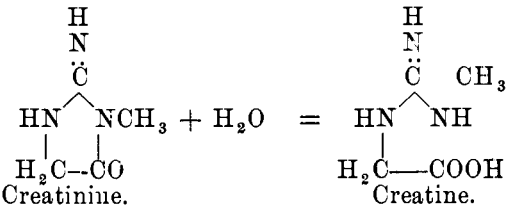
TAUTOMERISM.

The literature of this subject has no place in the index, as its bearing on stereochemistry is too indirect, and it seems sufficient to refer here to the review by

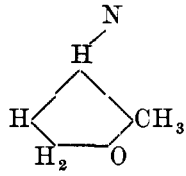
Orndorff, W. R., 1892. Am. Chem. J., **14,** 238–246.

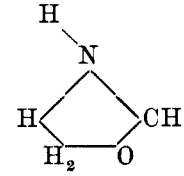
NOTE ON THE STEREOCHEMISTRY OF CREATININES.

These compounds seem to represent a new class of isomers. According to Johnson there are, including Liebig's base, four distinct substances having the composition of creatinine (besides three which differ in composition from these in that each contains two molecules of water). The fact that no more than one creatine has yet been obtained from the four creatinines shows they are probably identical in structure. In every case, so far as is known,

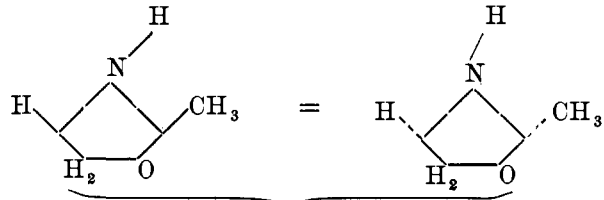


Now corresponding to this structural formula for creatinine there are, according to the Hantzsch-Werner theory, two stereomers:

I. 

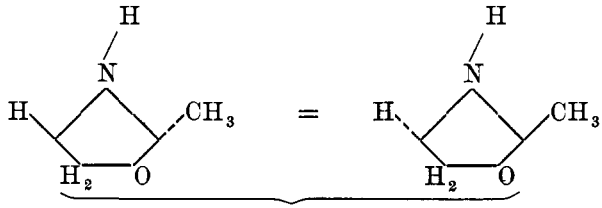
and II., 

but if the nitrogen valences maintain in this compound what is supposed to be their normal inclination of 120° (compare Bischoff, Ber. **23**, 1974), then the methyl-group and the corresponding hydrogen-atom are not in the plane of the ring, and each of the above formulae represents two compounds in one, of which H and CH_3 are on the same side, in the other on opposite sides of the plane of the ring. I. represents:



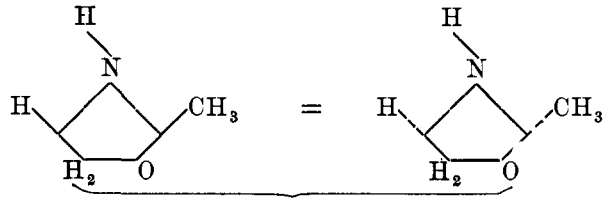
1.

and also



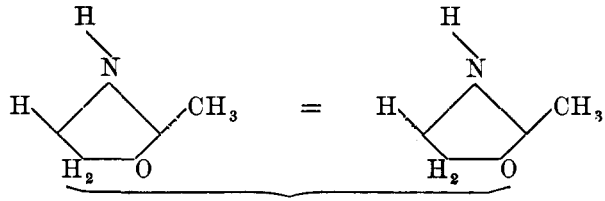
2.

II. represents:



3.

and also



4.

Theoretically, then, as practically, four creatinines are found to exist; and if this theory proves correct we must add to the nitrogen stereomers foreseen by Hantzsch and Werner another class consisting of the nitrogen analogues of the cis-trans isomers of Van't Hoff and von Baeyer. Of this class the creatinines would be the first known representatives.

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