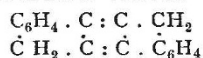


manner from that in the case of a constant current. The amounts of heat developed in wires of iron, German silver, brass, and copper 6 cm. long and of 0.018 cm. radius, were in the proportion of 10.5 : 1.75 : 1 : 1, the last being probably a little too large. The branching of the oscillations is only affected by the self-induction of the wires, not by their resistance.—The emission of hot gases, by F. Paschen (see p. 82).—A simple method of testing the conductivity of dielectric liquids, by K. R. Koch. The apparatus used for this method is a modified Dewar capillary electrometer, in which a drop of the substance to be examined takes the place of the drop of sulphuric acid usually employed for determining differences of potential. Any electrolytic polarisation is indicated by a movement of the drop of liquid, which should not be more than 0.5 mm. long. The conductivity of various dielectrics has thus been studied, and has in many cases been found to be due to impurities. Benzol, carefully cleaned and freed from moisture, ceased to show any polarisation.—On the magnetic susceptibility of oxygen, by R. Hennig (see Notes).

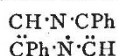
### SOCIETIES AND ACADEMIES.

LONDON.

**Chemical Society, November 2.**—Dr. Armstrong, President, in the chair.—The following papers were read:—The action of bromine on azobenzene: a correction, by H. E. Armstrong. The colourless bromination product of azobenzene is tetrabromobenzidine, and not a tetrabromazobenzene, as stated by Werigo.—The origin of colour. X. Coloured hydrocarbons, by H. E. Armstrong.—The formation of the hydrocarbon "truxene" from phenylpropionic acid and from hydrindone, by F. S. Kipping. On heating hydrindone with dehydrating agents, a hydrocarbon of the constitution

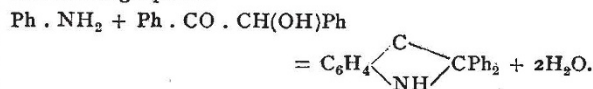


is formed; it is identical with truxene, to which the molecular formula  $\text{C}_{27}\text{H}_{18}$  has been erroneously assigned by Liebermann and Bergami. Further, Gabriel and Michael's "tribenzoylenebenzene" in all probability has the molecular formula  $\text{C}_{18}\text{H}_8\text{O}_2$  instead of  $\text{C}_{27}\text{H}_2\text{O}_3$ , as has previously been supposed.—The action of aluminium chloride on heptylic chloride, by F. S. Kipping. A crystalline ketone of the composition  $\text{C}_{14}\text{H}_{20}\text{O}$ , is formed by the interaction of heptylic chloride and aluminium chloride.—The inertness of quicklime. II. The interaction of chlorine and lime, by V. H. Veley. Dry chlorine has no appreciable action on quicklime below  $300^\circ$ ; above this temperature, a partial replacement of oxygen by chlorine occurs.—Note on hyponitrites, by D. H. Jackson. No hyponitrite is formed during the reduction of sodium nitrate with aluminium or barium amalgam. Diver's process for preparing hyponitrites gives the best results when a weak sodium amalgam is employed, and when the action proceeds at a low temperature.—The interaction of hydrogen chloride and potassium chlorate, by W. H. Pendlebury and Mrs. McKillop. The authors have determined the amounts of oxidising gases removed, during successive periods of time, from an aqueous solution of hydrogen chloride and potassium chlorate by a current of air. The action of sunlight on the solution materially increases the quantity of oxidising gas carried away by the air current.—The formation of indoxazen derivatives, by W. A. Bone. The author has studied the action of alkalis on orthochloronitrobenzaldehyde with the object of preparing nitroindoxazen; in place of this substance, however, the isomeric 1 : 2 : 5 nitrosalicylonitril was isolated, molecular change having occurred during the interaction. A number of new nitro-derivatives were obtained.—The interaction of benzylamine and phenacyl bromide. Synthesis of piazine derivatives, by A. T. Mason and G. Winder. Phenacyl bromide and benzylamine readily interact with formation of the hydrobromides of monophenacylbenzylamine,  $\text{Ph} \cdot \text{CO} \cdot \text{CH}_2 \cdot \text{NH} \cdot \text{CH}_2 \cdot \text{Ph}$  and diphenacylbenzylamine ( $\text{Ph} \cdot \text{Co} \cdot \text{CH}_2 \cdot \text{N} \cdot \text{CH}_2 \cdot \text{Ph}$ ); on liberating the bases, molecular changes occur. In the case of the monophenacyl-derivative, 1, 4-dibenzyl-2 : 5-diphenylpiazine dihydride is obtained; when this substance is heated to the boiling-point, it yields toluene and 2 : 5-diphenylpiazine.



A number of other piazine derivatives are also described.—The interaction of quinones and metanitriline and nitroparatolu-

idine: a preliminary note, by J. Leicester. The author describes a number of condensation products of quinones with *m*-nitraniline and nitro-*p*-toluidine.—Preparation of  $\alpha$ - $\beta$ -diphenylindoles from benzoin and primary benzenoid amines, by F. R. Japp and T. S. Murray. A mixture of benzoin, aniline, and zinc chloride yields  $\alpha$ - $\beta$ -diphenylindole, in accordance with the following equation



New substituted indoles may be prepared by the employment of other aromatic amines in place of aniline.

**Mathematical Society, November 9.**—A. B. Kempe, F.R.S., President, in the chair.—The resolution for the incorporation of the Society, and the list of names as new Council for the session 1893-4 (see NATURE, vol. xlviii. p. 619), were carried unanimously.—The President gave a brief account of the life and work of the late W. S. B. Woolhouse, and then accompanied the presentation of the De Morgan medal, which had been awarded by the Council in June last to Prof. F. Klein, of Göttingen, with an outline sketch of the grounds of the award. Prof. Greenhill, F.R.S., and Dr. Forsyth, F.R.S., who had been deputed by Prof. Klein, in his unavoidable absence, to receive the medal, suitably acknowledged the gift. The following communications were made:—A mechanical solution of the problem of tethering a horse to the circumference of a circular field, so as to graze over an  $n^{\text{th}}$  part of it, by Prof. L. J. Rogers. (The solution turned on a property of the cycloid).—The stability of certain vortex motions, by A. E. H. Love. The paper contains investigations of the steady motion and small oscillations of Kirchhoff's elliptic vortex, which rotates uniformly in the midst of an infinite mass of liquid, and of Hill's elliptic vortex, which rotates uniformly in the midst of a mass of liquid filling a confocal rigid envelope, the envelope rotating with the same angular velocity. It is proved that Kirchhoff's vortex is stable for all modes of oscillation in which the boundary ceases to be elliptic, provided the major axis is less than three times the minor axis. It is also proved that if the boundary is any ellipse, the vortex rotates steadily with angular velocity suitable to its eccentricity, and that it is impossible for it to change form and remain elliptic. The characteristics of the various modes of oscillation are made out, viz. it is shown that for each mode there is a definite number of wave-lengths of a simple harmonic disturbance in the circumference, provided the amplitude of the disturbance is measured by the ratio of the normal displacement of a point in the boundary to the central perpendicular on the tangent at the point. The general period equations are obtained, and it is shown in particular that Hill's vortex is always stable for elliptic displacements of the boundary of the vortex, the frequency for such displacements tending to zero when the vortex degenerates into a Kirchhoff's vortex by indefinite expansion of the external boundary of the liquid, thus verifying the results found in the more special case. It is also verified that the vortex sheet, which is another degenerate Hill's vortex, is always unstable for the more complex types of disturbance. Messrs. Hill, Basset, Greenhill, and Bryan spoke upon the paper.—Cyclo-tomic quartics, by Prof. G. B. Mathews.—On the application of elliptic functions to the curve of intersection of two quadrics, by J. E. Campbell.—Note on the theory of groups of finite order, by Prof. W. Burnside, F.R.S. The only quite general theorem at present known concerning the structure of a group (of finite order) is the following, due to Herr Sylow: "If  $p$  is the highest power of a prime  $p$  that divides the order of a group, the group contains a single conjugate set of sub-groups of order  $p$ , and the number of such sub-groups is congruent to unity, modulus  $p$ ." In the theory of groups of finite order, and especially in considering the possible structure of a group of given order, this theorem is fundamental. From its enunciation it is clearly independent of the form in which the group may be represented. The only published proofs of it, to the best of the author's knowledge, are the original proof by Herr Sylow (*Math. Ann.*, vol. v.), and a proof given by Herr Netto in his "Substitutionentheorie." These both depend essentially on the representation of the group as a group of substitutions, and also on the conception of transitivity in connection with this form of representation. A proof of the theorem is given in the first of these notes, which is as fundamental in conception as

the theorem itself, being entirely independent of the form in which the group may be supposed to be expressed. The latter part of the paper dealt with the orders of simple groups in certain cases.—Prof. Hudson showed and explained some mechanical constructions (by his son, R. W. Hudson) for the parabola, hyperbola, cubical parabola, and semi-cubical parabola.

**Royal Meteorological Society, November 15.**—Dr. C. Theodore Williams, President, in the chair.—Mr. F. J. Brodie read a paper on the great drought of 1893, and its attendant meteorological phenomena. The author confined his investigation to the weather of the four months, March to June, during which period the absence of rain was phenomenal; barometric pressure was greatly in excess of the average, temperature was high, with a large diurnal range, and the duration of sunshine was in many places the longest on record. The mean temperature over England was about 4° above the average. Along the south and south-west coasts the sunshine was between 50 and 60 per cent. of the possible duration. The rainfall was less than half the average amount over the southern and eastern parts of England, the extreme south of Ireland, and a portion of Durham and Northumberland; while over the southern counties of England generally the fall amounted to less than one-third of the average. The smallest number of days with rain was at the North Foreland, where there were only eighteen.—Mr. W. Marriott gave an account of the thunder and hailstorms which occurred over England and the south of Scotland on July 8, 1893. Thunderstorms were very numerous on that day, and in many instances were accompanied by terrific hailstorms and squalls of wind. It was during one of these squalls that a pleasure-boat was capsized off Skegness, twenty-nine persons being drowned. About noon a thunderstorm, accompanied by heavy hail and a violent squall of wind, passed over Dumfries and along the valley of the Nith; many of the hailstones measured from 1 inch to 1½ inches in length. At the same hour a similar storm occurred at Peterborough. From about two until ten p.m. there was a succession of thunderstorms over the north-east of England and south-east of Scotland, and at many places it was reported that the thunderstorms were continuous for nine hours. Two storms were remarkable for the immense hailstones which fell during their prevalence over Harrogate and Richmond in Yorkshire. The hailstones were 4 and 5 inches in circumference, and some as much as 3 inches in diameter. Great damage was done by these storms, all windows and glass facing the direction from which the storm came being broken. It is computed that within a radius of five miles of Harrogate not less than 100,000 panes of glass were broken, the extent of the damage being estimated at about £3000. The thunderstorms in the northern part of the country travelled generally in a north-north-westerly direction at the rate of about twenty miles an hour. They appear to have taken the path of least resistance, and consequently passed over low ground and along river valleys and the sea coast. Several storms seem to have followed each other along the same track.

**Royal Microscopical Society, November 15.**—A. D. Michael, President, in the chair.—Mr. C. L. Curties exhibited and described a microscope by Leitz, of Wetzlar, made on the English model, with tripod foot and inclining body, horse-shoe stage, and sub-stage fittings.—Mr. A. W. Bennett gave a *résumé* of Mr. W. West's paper on new British fresh-water Algæ.—Prof. F. Jeffrey Bell read a paper by Mr. G. Sandeman, on a parasitic disease in flounders. The author stated that there are often found on the coast flounders having small round swellings under the skin, which have been described under the name of multiple tumours. The tumours have the appearance of eggs, deposited irregularly beneath the skin. They cause a slight projection of the skin, which sinks slightly between the individual ova, but, when very many are present in one mass, the large tumour which is formed projects considerably from the body, and is sometimes even a pedunculated or finger-shaped formation. On microscopic examination, the contents of the tumours present all the characteristics of eggs. The cause and habits of the parasite are so obscure that the author finds it impossible to pronounce a definite opinion on the subject.—The President announced that the Society's conversation would take place in the early spring.—Mr. C. Beck raised a discussion as to the possibility of obtaining a standard tube-length. Dr. W. H. Dallinger congratulated Mr. Beck upon the able way in which he had brought the matter before them. He thought that a committee should be appointed to discuss the whole question.

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PARIS.

**Academy of Sciences, November 20.**—On a new model of a reverberatory electric furnace with movable electrodes, by M. Henri Moissan.—On equations of mixed functions and a problem of geodesics, by M. G. Koenigs.—On differential equations of the second order with fixed critical points, by M. Paul Painlevé.—On the means of increasing the security of high tension alternate-current distribution, by M. G. Claude. The elimination or diminution of the capacity of the mains with regard to the earth would make it necessary to touch the two poles of the circuit to receive a shock capable of endangering life. This may be obviated most conveniently by neutralising the capacity by self-inductions placed along the circuit.—Action of some metals upon acid solutions of their chlorides, by MM. A. Ditte and R. Metzner. If a plate of tin is plunged into a concentrated hydrochloric acid solution of stannous chloride upon which a layer of water has been poured, crystals of tin are rapidly formed near the surface of separation. The arrangement amounts to a galvanic cell, in which the same electrode is plunged into different liquids. A solution of stannic chloride shows the same phenomenon, which takes place as soon as the water has, by the diffusion of the salt, become sufficiently conducting to permit the passage of the current. The tin above the surface of separation merely acts as a negative electrode, and may be replaced by a platinum wire. That the phenomenon is one of electrolysis may be shown by replacing a small portion of the bar of tin by an insulator placed at the surface of separation. No crystals are deposited until the two separated portions are brought into communication by the diffusing salt. When the stannic chloride solution is placed in a porous pot in a vessel of acidulated water, and the two liquids are joined by platinum plates, no electrolysis takes place; but cadmium treated by the first method shows precisely similar phenomena. Zinc, which is easily dissolved by the most dilute hydrochloric acid, shows nothing similar. Nickel, which is quickly covered with a protecting layer of hydrogen, and also bismuth and antimony, which are insoluble in hydrochloric acid, show no phenomena analogous to those exhibited by tin.—Means of preserving wood from being worm-eaten, by M. Emile Mer. The attacks on the sap-wood by the insects are due to the presence of starch in this tissue. It may therefore be inferred that the fact of the hard wood being free from the invasion is due to its not being amyloiferous. The albumen may be protected by ridding it on starch. This may be done by annulation of the bark at the upper end of the trunk, and by suppressing all buds developed there. Spring is the best season for this operation. The starch has disappeared by autumn, and the trees may be felled during October. Carpenters and joiners will, in this way, be enabled to utilise the whole or part of the sap-wood.—On the development and maturation of the cider apple, by M. L. Lindet. In the maturation of the cooked apple the same transformations take place as during the ripening of the fruit on the tree. The quantity of starch accumulated in the green fruit diminishes, and this diminution coincides with the increase of the saccharose and inverted sugar; these sugars disappear in their turn through respiration.—On the minute structure of the terminal plates of the motor nerves of striated muscle, by M. Charles Rouget.—On the nematodes of the pharyngeal glands of ants, by M. Charles Janet. The two glands taken from an ant from an artificial nest (*Formica rufa*) appeared in the form of bunches of yellow tubes resembling actinia with numerous tentacles. Each tube was occupied by one or more *Rhabditis*, which could be dislodged in great numbers by slight pressure on the cover-glass. The whole nest turned out to be thus infested, although the ants appeared to be in good health. The nematodes appear to be a larval form of the sexed individuals living in a free state in the detritus of the nest.—On the polymorphism of *Peridinium acuminatum* Ehr, by M. Georges Pouchet.—On the north-east extremity of the main body of Mont Blanc, by MM. L. Duparc and L. Mrazec.—On the origin of the Alps of Chablais and Stockhorn, in Savoy and Switzerland, by M. Hans Schardt.—Discovery of another pre-historic magdalenoan deposit in the Vézère valley, by MM. Paul Girod and Elie Massénat.—On the variation of composition of lake-water with the depth, by M. A. Delebecque.

NEW SOUTH WALES.

**Linnean Society, September 27.**—The President, Prof. David, in the chair.—The following papers were read:—Descriptions of new species of *Bostrychidae*, by Arthur M. Lea.

—Botanical notes from the Technological Museum, Sydney. No. 1. by J. H. Maiden and R. T. Baker. The paper embodied a number of fresh localities for New South Wales plants, and also New South Wales localities for plants hitherto known only from Queensland, viz. *Decaspermum paniculatum*, *Psychotria nematopoda*, *Tetranthera ferruginea*, (*Litsaea hexanthus*). There are also recorded observations on *Amperea spartioides* with pedicellate female flowers, several at each node, *Hovea acutifolia*, with glabrous pods; notes on *Melodorum Leichhardtii*, *Sideroxylon myrsinoides*, *Blechnum serrulatum*, *B. cartilagineum*, *Eucalyptus saligna*, and others.—Preliminary note on a species of *Balanoglossus* from the coast of New South Wales, by J. P. Hill. *Balanoglossus*, hitherto unrecorded from Australia, has recently been met with, both at Broken Bay and at Jervis Bay, in loose sand under large stones between tide-marks. A detailed account of this interesting form, in all probability a new species, was promised.—Note on the presence of vestigial Mullerian ducts in a full-grown male lizard (*Amphibolurus muricatus*), by J. P. Hill.

DIARY OF SOCIETIES.

LONDON.

THURSDAY, NOVEMBER 30.

SANITARY INSTITUTE, at 8.—Textile Manufactures, Silk, Cotton, Woollen, and Linen Industries: Dr. J. T. Arlidge.

FRIDAY, DECEMBER 1.

GEOLOGISTS' ASSOCIATION, at 8.—Notes on a Discovery of Fossils at Little Stairs Point, Sandown Bay, Isle of Wight: Thos. Leighton.—Notes on the Sharks' Teeth from British Cretaceous Formations: A. Smith Woodward.—The Breaking-up of the Ice on the St. Mary River, Nova Scotia, and its Geological Lessons: Geoffrey F. Monckton.  
INSTITUTION OF CIVIL ENGINEERS, at 7.30.—Forms of Tensile Test-Pieces: Leonard H. Appleby.

SUNDAY, DECEMBER 3.

SUNDAY LECTURE SOCIETY, at 4.—The Body's Servants—A Talk about Cells and their Work: Dr. Andrew Wilson.

MONDAY, DECEMBER 4.

VICTORIA INSTITUTE, at 8.—Habit in Man: Dr. Schofield.  
SOCIETY OF CHEMICAL INDUSTRY, at 8.—Application of Air in Motion to Chemical Industry: H. G. Watel. (Adjourned Discussion).—Note on the Copper Mines of Singhbhoom: H. Harris.—The Product of the Action of Mercuric Chloride upon Metallic Silver: Chapman Jones.  
ARISTOTELIAN SOCIETY, at 8.—On the Import of Categorical Propositions: Miss E. E. Constance Jones.  
ROYAL INSTITUTION, at 5.—General Monthly Meeting.

TUESDAY, DECEMBER 5.

ZOOLOGICAL SOCIETY, at 8.30.—On the Geographical Distribution of Earth worms: F. E. Beddard, F.R.S.—On a Collection of Coleoptera sent by Mr. H. H. Johnston, C.B., from British Central Africa: C. J. Gahan.—On a Collection of Petrels from the Kermadec Islands: Captain F. W. Hutton, F.R.S.  
INSTITUTION OF CIVIL ENGINEERS, at 8.—Impounding-Reservoirs in India, and the Design of Masonry Dams: Mr. Clerke, Mr. Sadaseewjee, Colonel Jacob, and Prof. Kreuter. (Discussion.)

WEDNESDAY, DECEMBER 6.

GEOLOGICAL SOCIETY, at 8.—The Purbeck Beds of the Vale of Wardour: Rev. W. R. Andrews and A. J. Jukes-Browne.—On the Variety of Ammonites (*Stephanoceras*) subarmatus, Young, from the Upper Lias of Whitby: H. W. Monckton.—On a Picrite and other Associated Rocks at Barnston, Edinburgh: H. W. Monckton.  
ENTOMOLOGICAL SOCIETY, at 7.—On a Collection of Lepidoptera from Egypt: George T. Bethune-Baker.—The Rhynchophorous Coleoptera of Japan: Part III. Scolytidæ: Walter F. H. Blandford.

THURSDAY, DECEMBER 7.

ROYAL SOCIETY, at 4.30.—The Organogeny of *Asterma gibbosæ*: E. W. MacBride.—Reptiles from the Elgin Sandstone: Description of Two New Genera: E. T. Newton, F.R.S.—A Dynamical Theory of the Electric and Luminiferous Medium: J. Larmor, F.R.S.—Note on the Action of Copper Sulphate and Sulphuric Acid on Metallic Copper: Prof. Schuster, F.R.S.—On Copper Electrolysis *in vacuo*: W. Gannon.—On a Chart of the Symmetrical Curves of the Three-Bar Motion: W. Brennand.  
LINNEAN SOCIETY, at 8.—Catalogue of the Described Neuroptera Odonata (Dragonflies) of Ceylon, with Description of New Species: W. F. Kirby.—On the Cause of the Fall of the Corolla in *Verbascum*: Signor U. Martelli.  
CHEMICAL SOCIETY, at 8.—An Apparatus for the Estimation of the Gases dissolved in Water: Dr. Truman.—Metallic Oxides and the Periodic Law: R. M. Deeley.

FRIDAY, DECEMBER 8.

ROYAL ASTRONOMICAL SOCIETY, at 8.  
SANITARY INSTITUTE, at 8.—Metallic Poisons, Lead and Arsenic: Prof. T. Oliver.

SATURDAY, DECEMBER 9.

PHYSICAL SOCIETY, at 5.—A Potentiometer for Alternating Currents: J. Swinburne.—The Specific Resistance of Sea-Water: W. H. Preece, F.R.S.—The Calculation of the Coefficient of Self-Induction of a Circular Current of a Given Cross-Section and aperture; and The Magnetic Field of a Cylindrical Coil: Prof. G. M. Minchin.  
ROYAL BOTANIC SOCIETY, at 3.45.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

BOOKS.—By Moorland and Sea: F. A. Knight (E. Stock).—Laboratory Teaching: C. L. Bloxam, 6th edition (Churchill).—An Elementary Treatise on Theoretical Mechanics, Part 2—Introduction to Dynamics, Statics: A. Ziwet (Macmillan).—Micro-Organisms and Fermentation: A. Jorgenson, translated by A. K. Miller and E. A. Lennholm, new edition (Lyon).—Concrete, its Nature and Uses: J. L. Sutcliffe (Lockwood).—The Sacred City of the Ethiopians: J. T. Bent (Longmans).—University College of N. Wales, Calendar 1893-4 (Manchester, Cornish).—The Pamirs, 2 vols: Earl of Dunmore (Murray).—Against Dogma and Free Will, and for Weismannism: H. C. Hiler, 2nd edition (Williams and Norgate).—The Wilder Quarter-Century Book (Ithaca, N. Y. Comstock Publishing Company).—The Story of Our Planet: Prof. Bonney (Cassell).—The Elements of Applied Mathematics: C. M. Jessop (Bell).—A Year amongst the Persians: E. G. Browne (Black).—The Principles of Waterworks Engineering: J. H. T. Turner and A. W. Brightmore (Spon).—Science and Education: J. H. Huxley (Macmillan).—Letters of Asa Gray, 2 Vols.: edited by J. L. Gray (Macmillan).—Oxford Bible for Teachers, with Helps (two styles) (Frowde).  
PAMPHLETS.—A Check List of the Slugs: Prof. T. D. A. Cockerell (Dulau).—Temperature and Vertebrae? Dr. D. S. Jordan (Ithaca, New York).—Sulle Osservazioni Mareografiche in Italia, &c.: G. Grablovitz (Genova).  
SERIALS.—Notes from the Leyden Museum, Vol. xiv. No. 3, and Vol. xv. No. 4 (Williams and Norgate).—Sitzungsberichte und Abhandlungen der Naturwissenschaftlichen Gesellschaft Isis in Dresden, 1893, Jan. bis Juni (Williams and Norgate).—Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie, Siebzehnter Band v. Heft (Williams and Norgate).—Zeitschrift der Gesellschaft für Erdkunde zu Berlin, Band xxviii. 1893, No. 3 (Berlin).—Mittheilungen von Forschungsreisenden und Gelehrten aus der Deutschen Schutzgebieten, vi. Band, 4 Heft (Berlin).—Bollettino della Societa Geografica Italiana, Serie 3, Vol. 6, Fasc. 8-9 (Roma).

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