NEEDLE-FREE INJECTION TECHNOLOGY

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New or updated entries added since previous website posting of file dated 2006-Aug-31:

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Devices: Avant Guardian 101, Cool.click®, Glide™, Omnijet, Pro-Jeey 2000, SQ-PEN™, SQ-X™,

Patents: US 6056716, US 6746429

Acknowledgements:

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Legend:

~R.200#MonDay**:** Reprint copy requested on date indicated.
Double-indented items: Paper copy not yet received or not yet filed.

***ID:** Article on intradermal vaccination but NOT via needle-free injection device.

Kindly please address any additions, updates, corrections, and suggestions to:

Bruce G. Weniger, MD
bgw2(-at-)cdc.gov
Fax: [+1] 404-639-8834

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See FIGURE AT RIGHT =>

[See another image at Galante1866 and Galante1885]

X. M. Béclard présente à l'Académie, de la part de M. Galante, un petit instrument pour pratiquer l'hydro-puncture.

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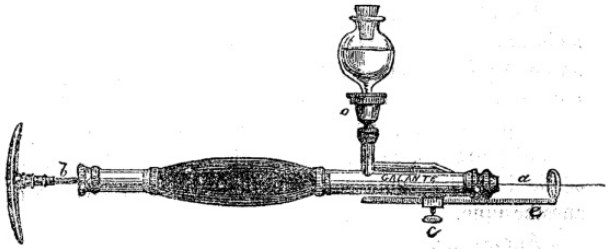
Un jet capillaire de liquide, lorsqu'il est projeté sur un point de la peau et avec la force de vingt-cinq atmosphères au moins, la perce, et le liquide est introduit dans les mailles des tissus organisés.

Il s'agissait de faire un petit instrument qui produisît ce jet et cette force; c'est ce qu'a fait M. le docteur Sales-Girons avec une seringue fabriquée par M. Galante.



Le liquide est contenu dans une petite ampoule de verre; en tirant le piston il entre dans le corps de la pompe, dont le diamètre n'excède pas 3 millimètres de calibre; en poussant avec le simple effet de la main, il sort un filet capillaire avec la pression voulue de 25 à 30 atmosphères.

Appliqué sur le point désigné de la peau, l'opération de l'hydro-puncture se pratique avec la plus grande facilité. Ce procédé est mis à profit aujourd'hui contre les névralgies rebelles, avec de l'eau pure ou des liquides médicamenteux.

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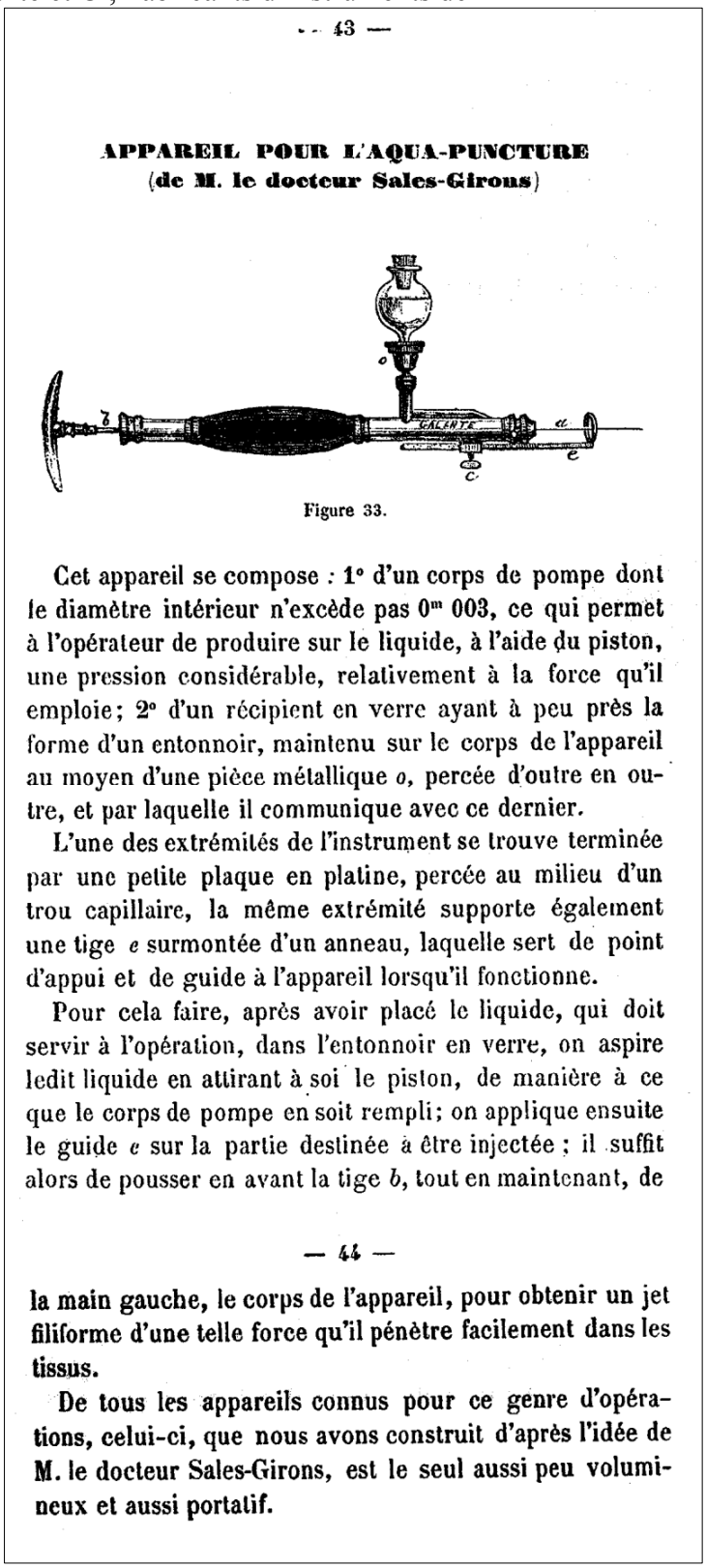
SEE FIGURE AT RIGHT → [See Béclard/Galante1866]



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APPAREIL POUR L'AQUA-PUNCTURE
(de M. le docteur Sales-Girons)

Figure 33.

Cet appareil se compose : 1° d'un corps de pompe dont le diamètre intérieur n'excède pas 0^m^ 003, ce qui permet à l'opérateur de produire sur le liquide, à l'aide du piston, une pression considérable, relativement à la force qu'il emploie; 2° d'un récipient en verre ayant à peu près la forme d'un entonnoir, maintenu sur le corps de l'appareil au moyen d'une pièce métallique *o*, percée d'outre en outre, et par laquelle il communique avec ce dernier.

L'une des extrémités de l'instrument se trouve terminée par une petite plaque en platine, percée au milieu d'un trou capillaire, la même extrémité supporte également une tige *e* surmontée d'un anneau, laquelle sert de point d'appui et de guide à l'appareil lorsqu'il fonctionne.

Pour cela faire, après avoir placé le liquide, qui doit servir à l'opération, dans l'entonnoir en verre, on aspire ledit liquide en attirant à soi le piston, de manière à ce que le corps de pompe en soit rempli; on applique ensuite le guide *e* sur la partie destinée à être injectée ; il suffit alors de pousser en avant la tige *b*, tout en maintenant, de

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la main gauche, le corps de l'appareil, pour obtenir un jet filiforme d'une telle force qu'il pénètre facilement dans les tissus.

De tous les appareils connus pour ce genre d'opérations, celui-ci, que nous avons construit d'après l'idée de M. le docteur Sales-Girons, est le seul aussi peu volumineux et aussi portatif.

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[Page 138 lists "Appareil aquapuncteur, de Dr. Sales-Girons, modèle Galante". Dr. J. Sales-Girons was *médecin inspecteur* of the thermal springs Pierrefonds-les-Bains. He also developed aerosol devices for pulmonary inhalation (http://www.epocnet.com/area_m/histepoc/figura27.html). See: Sales-Girons J. Traitement de la phthisie pulmonaire par l'inhalation pulvérisés et par les fumigations de goudron. Paris, F. Savy Librairie-Éditeur, 1859; p. 528, and 1860; and DuJardin-Beaumetz. Leçons de clinique thérapeutique. Octave Doin Ed. Paris, 1881.]

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LR - 20041117
PUBM- Print
IS - 0372-9311 (Print)
IP - 6
DP - 1984 Jun
TI - [Comparative evaluation of the reactogenicity and antigenic activity of

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PG - 79-84
AB - The reactogenicity and antigenic potency of existing inactivated influenza vaccines were tested on 750 practically healthy adults. In all the preparations under test the levels of reactogenicity were found to correspond to the Technical Specifications TY--KBC, but the subunit type vaccine, "Gripovac", proved to possess the lowest reactogenicity and was, therefore, recommended for further trials in young children. Taking into account the characteristics of antigenic potency, the work gives grounds for the necessity of increasing the content of hemagglutinin in the vaccine prepared by the centrifugal method and for the practical use of the same volumetric dose (0.2 ml) for both virion vaccines (prepared by the centrifugal and chromatographic methods).
FAU - Rudenko, L G
AU - Rudenko LG
FAU - Zykov, M P
AU - Zykov MP
LA - rus
PT - Journal Article
TT - Sravnitel'naia otsenka reaktogennosti i antigennoi aktivnosti otechestvennykh grippoznykh inaktivirovannykh vaktsin.
PL - USSR
TA - Zh Mikrobiol Epidemiol Immunobiol
JT - Zhurnal mikrobiologii, epidemiologii, i immunobiologii.
JID - 0415217
RN - 0 (Antibodies, Viral)
RN - 0 (Antigens, Viral)
RN - 0 (Influenza Vaccines)
RN - 0 (Vaccines, Attenuated)
SB - IM
MH - Adult
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MH - Antigens, Viral/adverse effects/*immunology
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MH - Drug Evaluation
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MH - Hemagglutination Inhibition Tests
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DEVICE & MANUFACTURER ROSTER
(past & current, listed by device tradename)

Accell® (see **Helios™**)

Advantajet™, **Freedom Jet™**, **GentleJet™**, (identical to **PreciJet™, Preci-Jet 50®**)
See: Bareille1997, Hartikka2001,
http://www.advantajet.com/index.html
Activa Brand Products – c/o Tube-Fab, Inc. **Mississauga Facility.** Eric Foley - Vice President of Operations, efoley@tube-fab.com, 6845 Davand Drive, Mississauga Ontario L5T 1L4, Phone 905-565-0223 Fax 905-565-0065. **Charlottetown Facility**, Phillip Rafuse - Business Manager Atlantic Canada, prafuse@tube-fab.com, 36 Fourth Street, Charlottetown PEI C1E 2B3, Phone 902-566-3229 Fax 902-629-1404
USA distributor: Carousel Medical Systems, Inc. (http://www.carouselmed.com), 7343 Surf Drive, Kempton, PA 19529, Tel: +1 866-640-6890, Fax: +1 703-935-7530.
[Former manufacturers: Advanced Medical Technologies, Charlottetown, Prince Edward Island, Canada. Later: Health-Mor Personal Care Corp. 185 East North Street, Bradley, Illinois 60915, 815-932-5570, fax 815-932-4101, bought back by Canadian company in 1998.]

Agro-Jet® (see **Med-Jet™**)

Am-O-Jet™
See: Hoffman2001 (injector A)
American Jet Injector, Inc., 880 Orchard Lane, Lansdale, PA 19446-4520,
Tel: (215) 362-4815, Fax: (215) 362-4819, pager: 800-609-7231
Orifice: .005 inch = 0.127mm
Same out-of-patent design as Ped-O-Jet®

Avant Guardian™ 101
Avant Medical Corporation, 3914 Kendall Street, San Diego, CA 92109
FDA 510(k) no. K024018 (http://www.fda.gov/cdrh/pdf2/k024018.pdf)

Avijet (see **Syrijet Mark IV**) **Avijet** (Merial) – see Endos Pharma **Vaccijet Electrique**
See: Eidson1976
(Mizzy, Inc., New York, NY?), Endos Pharma, Laons, France (Vaccijet technology acquired by Antares Pharma)
VIDEO: http://br.merial.com/avicultores/suporte_tecnico/avijet/avijet.asp

Berijet
Behring, Frankfurt Germany
See: Zachoval1988

BI-100™, BI-100a™, BI-100b™, BI-1, BI-1M™, BI-2, BI-3, BIP-4, BI-8, BI-19, ISI-1,

США [**SShA**]
[see: **HSI-500™, Pulse™ 200**]

See: Agafonov-multiple years, Saltykov1971, Vorob'ev1972 (photos), Lebedinskii1979, Lev1972, Lev1972e, Nikiforov1974, Loktev1980, Rudenko1984, Iatskova1988, Levina1988, Vasil'eva1988, Efimov1989, Gorbatov1989, Provotorov1990a,b,c Anonymous1991, Provotorov1991, Gapochko1992, Evstigneev1994, Lukin1997, FedLabs2003, Khitrov2005

Chemical Automatics Design Bureau (KB Khimavomatiki), Voronezh, Russia
http://www.chimavtomatika.ru/. Technology developed at Всесоюзном научно-исследовательском институте хирургической аппаратуры и инструментов (ВНИИХАИ) [All-Union Scientific Research Institute of Surgical Equipment and Tools (VNIIKHAI)], also known as Scientific & Research Institute of Surgical Instruments and Equipment (engineers L.F. Banacov, S.P. Vanjushin, and m.M. Trusov).
MedEquipment, Russki Most Management

In 1998, rights to 17 Russian injectors purchased from entities above by:
Felton Medical, Inc. and Felton Medical International
11535 West 83rd Terrace, Lenexa, Kansas (KS) 66214
Tel: [+1] (913) 599-5959, Fax: [+1] (913) 599-0909, felton@wws.com
http://www.feltonint.com/
http://www.feltonmedical.com/
http://www.path.org/files/htup-JetInjector.pdf
http://cisa1.lanl.gov/Forms/Alan.pdf
http://www.kcp.com/servlet/Content/newsroom/PRView.ep?story=BSDNACANAWHSICSNASHA6A2KBW&archived=1

Biojector™ 2000, Iject™ (see **Vitajet**®)

See: Monroe1992, Jackson1993, Davis1994, Greenberg1994, Greenberg1995, Baer1996, Davis1996, Fish1996, Gerbert1996, Williams1996, Anonymous1997, Florentine1997, Gardner1997, Matheï1997, Bennett1998, Gramzinski1998, Phero1998, Smith1998, Bioject1999, Marshall1999, Zsigmond1999a, Zsigmond1999b, Cartier2000, Ledwith2000, Manam2000, Marshall2000, Perricone2000, Williams2000, Amara2001, Aguiar2001, Baizer2001, Evans2001, Hartikka2001, Jackson2001, Mossman2001, Singh2001, Wang2001, Epstein2002, Evans2002, O'Neill2002, Schramm2002, Timmerman2002, Babiuk2003, Buge2003, Harrop2003, Mossman2003, Mumper2003, Raviprakash2003, Trimble2003, Fine2004, Koenig2004, Stout2004, Wyatt2004, Adamo2005, Benedek2005, Brave2005, Choi2005, Nicolau2005, Rao2006, Sadagopal2005, Wang2005, Graham2006, Giudice2006, Harris2006a, Harris2006b, Martin2006, Sheets2006a, Sheets2006b, Catanzaro2007, Tavel2007, Yoong2007, Hallermalm2007, Boyer-Chuanroong-undated, Herbst-undated, Stone-undated, Schultz-undated,
http://www.bioject.com/, http://www.fda.gov/cdrh/pdf/K960373.pdf

Bioject Inc., 20245 SW 95th Ave., Tualatin, OR, USA 97062-7541)
FDA 510(k) nos. K920631 and K960373 (http://www.fda.gov/cdrh/pdf/k960373.pdf)

BIOJECTOR ORIFICES:	inches	mm	Indication
cartridge #2 (green 1502100) =	0.0039 inch	0.10 mm	SC (ID with investigational 2cm spacer)
cartridge #3 (brown 1503100) =	0.0059 inch	0.15 mm	IM thigh - infants 15-20" height, 0-15 lbs. weight; IM deltoid - 21-47"/16-50 lbs
cartridge #4 (blue 1504100) =	0.0078 inch	0.20 mm	IM thigh/gluteus 21-47"/16-75 lbs. IM deltoid children >50 lbs, small adults (<80% median lean weight for height)
cartridge #5 (silver 1505100) =	0.0098 inch	0.25 mm	IM deltoid average adults (80-120% median lean weight for height)
cartridge #7 (red 1507100) =	0.0142 inch	0.36 mm	IM deltoid large adults (>120% median lean weight for height)

Biostar

Biostar, Inc., 343-111 Research Drive, Saskatoon, Saskatchewan S7N 3R2, Canada,
Tel: [1](306) 931-7500, Fax: [1](306) 242-9010,
email: jmanns@innovplace.saskatoon.sk.ca

Cool.Click®, SeroJet™

Serono International S.A., 15bis, chemin des Mines, Case postale 54, CH-1211 Geneva 20, Tel: +41-22-739 3000, Fax: +41-22-731 2179
(Injector manufactured by Bioject, Inc. using VitaJet® design)

Crossject

Crossject S.A.
12 quai Henri IV, 75004 Paris, France
Tel: (+33) 1 48 04 67 45, Fax: (+33) 1 48 04 67 23
info@crossject.com
Created in 2001 with partners: **SNPE group** (energy materials and fine chemicals), **Federa** (aseptic filling and phamaceutical development), **Schott/Forma Vitrum** (glass drug container), and **Bertin** (specific engineering technology skills).

DCI, Inc.

See **LectraJet™**

Dentjector®
Robbins Instruments Company, Chatham, NJ 07928
See advertisement and photograph on page 97 after Greenfield1972 article.

Derata Medi-Jector V
see **Medi-Jector** (below)
Depuy, Inc., 700 Orthopaedic Drive, Warsaw, IN 46581-0988,
Fax: 219-267-7196, Sales: 219-267-8143, 800-366-8143

Dermo-Jet™ [**Dermojet**], **VACCI-JET** (France)
(various models)
See: Krantz1959, Stephens1962 [photo], Spiess1964, Bleasdale1965, Juel-Jensen1965, Rey1965a, Schön1965 [photos], Calvert1966, Cooper1966, Lane1966, Martin-du-Pan1966, Jeanneret1967, Rey1967, Shapiro1967 [photos], Sherman1967, Krantz1970, tenDam1970, Welty1970, Griffiths1971, Bakhur1972, Rey1972, Steinbrocker1973, Bonner1973, Lachapelle1977, FernándezdeCorres1982, Lachapelle1982a, Lachapelle1982b, Kok1983, Lachapelle1985, Dimache1986, Mihailescu1989, Dimache1991a, Dimache1991b, Brodell1995, Furth1995b, Dimache1997, Naumann1998, Vadoud-Seyedi2000,
Société AKRA, 23 bis rue Louis Barthou, Pau, FRANCE 64000, Tel: [+33] 59 274746, Fax: [+33] 59 272270, http://www.dermojet.com, http://www.chez.com/dermojet/, dermojet@club_internet.fr
Previous U.S. distributor: Louis A. Awamy, 113 Sheraden Avenue, Staten Island, New York 10314.
(Orifice = 0.2mm = 200um)

Dermo-Jet, DermoJet, Dermo Jet (United Kingdom distributor)
See Bleasdale1965, Shapiro1967 [photos[
Schuco International London Ltd., Lyndhurst Avenue, London, N12 0NE, United Kingdom, Tel: +44 (0) 20 8368.1642, Fax: +44 (0) 20 8361.3761, Sales@schuco.co.uk, http://www.schuco.co.uk, http://www.schuco.co.uk/showindex.asp?cat=30, http://www.schuco.co.uk/Information/Pages/Injector%20Info.asp, http://www.schuco.co.uk/Information/DermoJet%20Bulletin.pdf
Previous licensee of French/dealer: Mill-Bilt Equipment Co, Scotland

Dermojet, Dermo-jet (Romania)
model S-591-H (perhaps others)
no. 106078 B1 OSIM Romania
Manufactured by Aerotech S.A., Hydraulic and Pneumatic Equipments, Bucharest, Romania (see Dimache1997).
Ormont Drug and Chemical (see Shen1981)

E-Jet 600™ jet injector (**E-Jet 100™** needle-free lancet)

Eurojet Medical, Kft., Orion u. 14, H-1214 Budapest, Hungary
Mail address: P.O. Box 105, H-7201 Dombóvár, Hungary
Tel: [+36] 1 427-0313, -0314, -0315; Fax: [+36] 74 460-854; info@ejm.hu;
http://www.ejm.hu/
Canadian-Hungarian joint venture

EMS/MPM (see **Swiss Injector®)**

EMS/RPM (see **Swiss Injector®**)

Genesis Medical Systems, Inc. (See Sensa-Jet)

Genotropin® ZipTip™ (See **ZipTip™,** below)

Glide™

Glide Pharmaceutical Technologies Limited ("Glide Pharma"), 45B, Milton Park, Abingdon, OX14 4RU, UK
Tel: +44 (0) 8700 853700, Fax: +44 (0) 8700 853704
E-mail: charles.potter@glidepharma.com
http://www.glidepharma.com

Formerly known as the ImplaJect® device, developed by Caretek Medical, Ltd. (www.caretekmedical.co.uk), which announced its corporate name change to Glide Pharmaceutical Technologies, Ltd. in September 2006.

GunA

See: Cartier2000
Max Planck Institute of Biophysical Chemistry, Göttingen, Germany
"Designed and constructed by P.A.F."

Helios™ "gene gun"

(related **Accell®** [Agracetus, Madison WI] and **Biolistic® PDS 1000/He** bombardment systems) (Device limited by licensing/patent/licensing restrictions to non-human usage.)
See: Williams1991, Fynan1993, Livingston1995, Pertmer1995, Haynes1996, Feltquate1997, Ren2002
Bio-Rad, Inc., http://www.bio_rad.com, Life Science Research Group, 2000 Alfred Nobel Drive, Hercules, CA 94547, Tel: (510) 741-1000, toll free 1-(800) 424 6723, Fax: (510) 741-5800, toll free fax: 1-(800) 879 2289, telex: 335-358.

HSI-500™ , **Pulse™ 200, BI-3M™** [see: **BI-100™**, etc.]

See: Giudice2006,
Felton Medical, Inc. and Felton Medical International
11535 West 83rd Terrace, Lenexa, Kansas (KS) 66214
http://www.feltonmedical.com/
http://www.fda.gov/cdrh/pdf/k013256.pdf

http://www.fda.gov/cdrh/pdf4/k041280.pdf

Hypospray®, Hypospray® Professional model, **Hypospray® K, K2, K3** models
See: Hingson1947, Anonymous1948, Figge1948, Hingson1948a,b, Hirsh1948, Hughes1948, Hingson1949, Hughes1949a (photo), Hughes1949b, Larrick1949, Perkin1950 (photo), Hingson1952, Ziff1956, Towle1960 [photos], Barrett1962, Hertzberger1964, Spiess1964, Clark1965 (model K), Cockburn1965, Cunningham1965, Schön1965 [photos], Calafiore1966, Garbsch1966, Lenz1966, Weller1966, Baum1967, Morse1967, Spiess1968, Wright1968 (photo), Davies1969, Hughes1969a (photo), Hughes1969b (photo), Helm1969, Gross1970, Welty1970, Neumann1973, Werner1974, Vadhera1975, Clarke1975, Horn1975, Linder1979, WHO1980, Briel1981 (german mfg., see below)

Hypospray and Hypospray Professional models: Manufacturer: R.P Scherer Corp, Detroit, MI, 1933-1998 (http://www.rpscherer.com), absorbed in 1998 into drug delivery unit of Cardinal Health (http://www.cardinal.com/pts/content/delivery)
British distributor: Crookes Laboratory, Basingstoke (Wright1968)
"Metapule" orifice = 0.003 - 0.005 inch = 0.076 - 0.127 mm (75-80um = 0.003)
Hypospray K3 model manufacturer: Messer Griesheim GmbH (subsequently became BIT Analytical Instruments GmbH, 65824 Schwalbach, Germany)

Hypospray K3
Briel1981,
Hypospray K3 model manufacturer: Messer Griesheim GmbH (subsequently became BIT Analytical Instruments GmbH, 65824 Schwalbach, Germany)

Hyjettor
See: Linder1979, WHO1980
Tokyo Sokuhan Co., Ltd. (now Nidec Tosok Corporation), Japan (http://www.tosok.co.jp/gaiyo/e_gaiyo.html)

Iject™ (see **Biojector® 2000**)

Imo-Jet™, Im-O-Jet™, I.M.-O-JET™ (Also see **Mini-Imojet®**)
See: Greenwood1980, Whittle1987, Rey1989, Galy1992
multiple-use-nozzle jet injector device
Institut Mérieux, Lyon, France

ImplaJect® (see Glide™)

Injet-100
Injet Medical Products, Inc., 22500 Muirlands Boulevard, Lake Forest, CA 92630

INJEX® 30, INJEX® 50, ROJEX™ ZipTip™ (see **Genotropin®**)
See: Sarno2000, Harsch2001, Sarno2002, Dorr2003 Dörr2003 (ZipTip),

Geenen2004, Wagner2004, Giudice2006, Zarzecka2007,

INJEX - Equidyne Systems, Inc. (subsidiary of HNS International, Inc.), 17662 Irvine Blvd., Suite 20, Tustin, CA 92780, Tel: 1 (949) 496-1899, 1 (714) 508-6408, Fax: 1 (714) 508-6409, http://www.injex.com , http://www.equidyne.com, http://www.pharma.it/eng/injex.htm

Formerly American Electromedics Corporation. Equidyne held partial stake in Rösch AG Medizintechnik, Germany, which developed and obtained US FDA 510-k (#020786, 2002) for INJEX and ROJEX devices for growth hormone application.
http://www.kressdesign.com/equidyne/about-releases.html
http://www.prnewswire.co.uk/cgi/news/release?id=55834
http://www.highbeam.com/doc/1G1-92259074.html

Introduced to US market ~2000.

Intraject™

~~Weston Medical, Ltd. New Street, Stradbroke, Eye, Suffolk, England 1P21 5JG, UK, Tel: [+44] (1379) 383-900, Fax: [+44] (1379) 384-800 .http://www.weston-medical.com~~

Acquired by Aradigm Corporation, http://www.aradigm.com/tech/intraject.html

Isajet™ (see **Mesoflash®**)

See: **Haensler1999**

Ject-Aid [?? NOT YET CONFIRMED AS "NEEDLE-FREE" ??]

Past addresses:

Autoject Systems, Inc., Oakwood Centre, 620 Wheat Lane, Oakdale, IL 60191 USA ???

Injectec, Inc., 11278 Los Alamitos Blvd, Suite 202, Los Alamitos, CA 90720 USA ???

J-Tip®, **J-Tip® Injector System**

See: Keshtgar1999a, Keshtgar1999b, Cooper2000, Hollingsworth2000, Lysakowski2003, Lysakowski2004, Stephens2003, Fine2004, Cigna2006, Jimenez2006,

US Patent no. 4,913,699

National Medical Products (Tim Chapman), 57 Parker Street, Irvine, CA 92618
Tel: [+1] (949) 768-1147, Fax: [+1] (949) 768-1167, info@jtip.com
http://www.jtip.com

(Formerly: California Medical Innovations, Inc., 24121 Big Timber Street, Lake Forest, CA 92630)

0.5 mL device: orifice size 0.008 inch (0.2 mm)
0.25 mL device: orifice size 0.006 inch (0.15 mm)

LectraJet™ (tentative, *inter alia*)

See: Carter2003, Giudice2006 (photo),

D'Antonio Consultants International (DCI), Inc.
6308 Fly Road, E. Syracuse, NY 13057

Tel:(315)463-4999 Fax: (315)463-5267 Email: rdci1@twcny.rr.com
Error! Hyperlink reference not valid.
US patents 5080648, 5318522, and US5569190

"Low-force Injector", GunA
See: Furth1995b, Cartier2000
Max Planck Institute of Biophysical Chemistry, Göttingen, Germany (designed and constructed by Priscilla A. Furth)
"Selected parts of a Dermo-Jet (Bodo Schmidt GmbH, Göttingen, Germany) were used in the construction of the Low-force injector."

MadaJet™, MadaJet XL ™
See: Field1985, Lamm1985, Nathan1986, Kaplan1987, Wenger1990, Seyam1997, Sawamura1999, Munshi2000, Davis2001, Wilson2001, Hawkins2002, Monoski2006
MADA Medical Products, Inc.
http://www.madainternational.com/us/menu_us.html
US:
MADA Equipment Co., Inc.
60 Commerce Road, Carlstadt, NJ 07072, USA
Tel: 1-201-460-0454, Fax: 1-201-460-3509, Toll Free: 1-800-526-6370
110522.1404@compuserve.com
International:
MADA International, Ltd.
11430 N. Kendall Drive Suite 312, Miami, FL 33176, USA
Tel: 1-305-274-2184, Fax: 1-305-274-2692, info@madainternational.com

Med-E-Jet™ (**Pow'r-Ject™** - veterinary application)
See: Cohn1972, Cohn1974, CDC1977, Neufeld1977, McKenzie1978 (modified with photograph), Glosemeyer1979, Linder1979, MedEJet1979, Cooke1980, WHO1980, Pepall1981, Seddon1981 [good photo], Seddon1984, CDC1986, WHO1986, WHO1988, Canter1990, WHO1993a, CDC1994, Vahlsing1994, Zsigmond1995a Zsigmond1995b, CDC/WHO1996, Zsigmond1996, WHO1997b, WHO1997c, Zsigmond1997, Zsigmond1999a, Zsigmond1999b, Hoffman2001 (injector D),
Current owner: Donald Kuch, 8092 Olmway Avenue, Olmsted Falls, Ohio 44138, Tel: 1-800-231-4203, tel: 440-235-2279, fax: 440-235-2247).
Prior owner: "**Med-E-Jet Inoculator**", Evans Enterprise, 1293 Sunset Road, Mayfield Heights, Ohio 44124 USA, tel: (440) 473-1110, fax: (440) 473-1150, Evans@star21.com
Prior owner: Med-E-Jet Corporation, 12900 (later 12640) Trisket Road, Cleveland, Ohio 44115
orifice size: 0.15mm (Seddon1981)

MEDiVAX™

See: Hoffman2001 (injector B)
Air-powered from foot pump. On-tool vials pumped into disposable-cartridge dose chamber.
Program for Appropriate Technology in Health (collaboration with Vitajet Corp.)
4 Nickerson Street, Seattle, Washington
Orifice = 0.006 inch
http://www.path.org

Med-Jet™, Agro-Jet® (http://www.wltdistributors.com/needle.html)
See: Lamontagne2002, Benohanian2005,BenohanianUndated,
Medical International Technologies (M.I.T.) Inc.
2281 Guenette, Ville Saint-Laurent
Montréal, Québec H4R 2E9 Canada
Tel: 514-339-9355, Fax: 514-339-2885
kmenassa@mitcanada.ca, marketing@mitcanada.ca

Medi-Jector, Medi-Jector EZ®, Medi-Jector Choice®, Medi-Jector VISION®
See: NeufeldPD1977 [photo], Martins1979 [photo], Houtzagers1988 (Medi-Jector II), Denne1992, Delemarre-VandeWaal1995, Partsch1997 (Medi-Jector IV), Gonzalez1997, Hartikka2001 (Medi-Jector Choice), Schwartz (Vision), Velussi (Vision)
Medi-Jector (MUNJI, circa 1970, orifice 0.006" diam, peak pressure 18k psi, delivery pressure 2.3k psi [Martins1979]).
Medi-Jector IV (circa1987 onwards
Medi-Jector Choice (circa
Medi-Jector Vision (introduced 1999)
http://www.mediject.com/
Antares Pharma (corporate site: http://www.antarespharma.com/)
[Formerly: Medi-Ject Corporation]
[Formerly: Daystrol-Scientific, Inc. Minneapolis, MN 55435]
[Formerly: Derata Corporation (see Pehling)]
Former address: 161 Cheshire Lane, Suite 100, Minneapolis, MN 55441 USA (800) 328-3074 or (612) 475-7700. Fax: (612) 476-1009
Latest address: 161 Cheshire Lane, Suite 100, Minneapolis MN 55441 USA, tel 612-475-7705, fax 612-476-1009

Mesoflash® M10 and **M40, Isajet™ Isa10** and **Isa40**
See: Lachapelle1985, Haensler1999
Prolitec SA, rue Gustave Gresse, 26400 Aouste sur Sye, France
Tél (04) 75 76 60 53, Fax (04) 75 76 60 54, pprolitec@compuserve.com
(**Mesoflash®** models M10 and M40, **Isajet™** models Isa10 [mice], **Isa40** [humans])
Formerly: Béarn Mécanique Aviation S.A. (Boite Postale 41, Lons, F-64143 Billère, Cedex France)

mhi-500™ (InsulinJet™)
See: Brown2004, Cann2005

The Medical House PLC, 199 Newhall Road, Attercliffe, Sheffield S9 2QJ, United Kingdom, Telephone: +44 (0)114 261 9011, Fax: +44 (0)114 243 1597. info@insulinjet.com, http://www.insulinjet.com, http://www.themedicalhouse.com
(Adaptation of VitaJet® design and intellectual property under license from Bioject. Inc.)

Mini-Imojet® (using **Imule**® cartridge) (also see **Imo-Jet**)
See: Galy1992, Spiegel1994a, Fisch1996, Parent du Châtelet1997, Schlumberger1999, Giudice2006
Pasteur-Mérieux Sérums et Vaccins (Pasteur Merieux Connaught, Rhône Poulenc, later Aventis Pasteur): Dr. Jean Lang: lang@bdr.pasteur-merieux.fr, 58 avenue Leclerc - B.P. 7046, 69348 LYON, Cedex 07 FRANCE, Tel: (33) 7273 7036, Fax: (33) 72 73 78 13

Mini-Ject™
See: Rao2006
Valeritas, LLC (becomes Valeritas, Inc. in 2007), a wholly-owned subsidiary of Biovalve, Technologies, Inc., Westborough, MA 01581, USA
http://www.valeritas.com, http://www.biovalve.com, http://www.mpmcapital.com/Flash/portfolio/biovalve.html

Omnijet
MUNJI manufactured in Brazil circa 1970s/1980. Developed by Sergio Landau. Vitajet Indústria e Comércio Ltda, Rua Belisário Pen, 688, Rio de Janeiro 21020, Brazil, Tel : [021] 270-5747, Telex: (021) 35487 VJET

Pan-Jet, **PanJet, Panjet-70, Panjet Mark 5 ("Intrajet")**
See: British Thoracic and Tuberculosis Assocation 1971, Stanfield1972, Stanfield1975 [photo], Paul1978, Lambrianidis1979, Sowray1981, Berry1981, Parker1984, Whittle1987
SHUCO International London, Ltd., Lyndhurst Avenue, London, N12 0NE, Tel: +44 (0) 20 8368.1642, Fax: +44 (0) 20 8361.3761, Sales@schuco.co.uk, http://www.schuco.co.uk, http://www.schuco.co.uk/showindex.asp?cat=53, http://www.schuco.co.uk/Information/Pages/Injector%20Info.asp
Former U.S. distributor: Panray Division, Ormont Drug and Chemical Co., South Dean Street, Englewood, New Jersey 07631.

Pchelka jet injector (Russia)
See: Uglovoi1975

Ped-O-Jet® (successor of **Press-O-Jet**)
See: Warren1955, Elisberg1956, Benenson1959, Gateff1960s/1970s, Hertzberger1964, Meyer1964, Meyer1964b, Millar1964, Kutscher1965, Meyer1965, Hendrickse1966a, Hendrickse1966b, Artus1966, Meyer1966a, Meyer1966b, Weibel1966, Kalabus1966, DoD1967, Kalabus1967, Bettag1967, Budd1967, Morse1967, Rey1967, Gateff1968,

Dull1968, Davies1969, Millar1969a, Millar1969b, Neff1969, Chambon1970a/b/c, Gateff1970, Fillastre1970, Welty1970, Labusquiere1971, Millar1971, Gotschlich1972a, Gotschlich1972b, Rey1972, Carnus1973, Rey1973, Rubin1973, AmatoNeto1974, Carnus1974, Machado1976, Neufeld1977, Triau1979, Mohammed1981, Lemon1983, Pluciennik1985, Fenner1988, Hoke1988, Ped-O-Jet-International1991, CDC1992, Furth1992, DoD1994, Furth1995a, Furth1995b, Jenkins1995, Cartier2000, Souto2001, Carter2003, *inter alia*

U.S. patents no. 3,057,349, 3,140,713, 4,103,684

Current Ped-O-Jet manufacturer registration at FDA:
http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfRL/registration.cfm?ID=16128

MYCONE DENTAL SUPPLY CO., INC.
616 hollywood ave. cherry hill, NJ 08002
Registration Number: 2280629
Operations: Initial Distributor, Contract Manufacturer, Repackager/Relabeller, Manufacturer
Status: Active
Date of Registration Status: 2005

Owner/Operator:
MYCONE DENTAL SUPPLY CO., INC.
616 hollywood ave. cherry hill, NJ 08002
Owner/Operator Number: 9007845

Official Correspondent:
robin pluese
KEYSTONE INDUSTRIES
616 hollywood ave. cherry hill, NJ 08002
Phone: 856-663-4700

Manufacturer/distributed by Ped-O-Jet International - Keystone Industries, 616 Hollywood Avenue, Cherry Hill, NJ 08002, Tel: 609-663-4700, Fax: 609-663-0381, nkeystone@aol.com

Previous manufacturers of Ped-O-Jet and forerunner devices (reverse chronological order):

(1) Stirn Industries, Dayton NJ (US production, French ownership)
(2) Vernitron Medical Products, Inc., Carlstadt, NJ; Vernitron Corporation, Farmingdale, NY
(3) Scientific Equipment Manufacturing Corporation (SEMCO), Lodi, New Jersey; and also Larchmont, New York (previous name "Hypodermic jet injection apparatus, automatic")
(4) Medicinal Equipment Development Laboratory, Fort Totten, NY (Aaron Ismach, Chester Eppley; see Benenson1959a)
(5) Walter Reed Army Institute of Research, Washington, DC (COL Abram S. "Bud" Benenson, LT COL R.B. Lindberg, CAPT Adrian D. Mandel, Joel Warren,

Frank A. Ziherl, Arthur W. Kish, Charles E. Buckler; see Benenson1959a)
Intramuscular and intradermal nozzle orifice diameters: .005 inch = 0.127mm

PenJet™
(US patents 5,730,723 & 5,851,198)
Visionary Medical Products Corporation; Penjet™
Box 6911, Beverly Hills, CA 90212, Tel: 310-201-0800, info@vmpc.com
http://www.vmpc.com/

Porton Jet Injector (aka **Porton Needle-less Injector), Port-O-Jet**
See: Moynahan1965, White1969 (x-ray), Darlow1970, Thomas1971, Vibes1971, Gaylarde1972, Abell1973a, Abell1973b, Abell1973c, Bleeker1974, Payler1974, Bleeker1975, Verbov1976 [good photo],
Porton Microbiological Research Establishment, Porton Down, Wiltshire, UK.

Powderject™, **PowderJect ND5.2**
See: Dégano1998, Duckworth1998, Dean2004, Lahm2006, Giudice2006,
PowderMed (Oxford, UK), http://www.powdermed.com
Needle-free epidermal powder immunization technology spun off by Chiron Corporation (http://www.chiron.com) upon acquisition of Powderject Vaccines in 2003
Formerly PowderJect Vaccines, Inc., 585 Science Drive, Madison WI 53711, Tel 608-231-3150, Fax 608-231-6990, http://www.powderject.com/, russ_smestad@powderject.com, lendon_payne@powderject.com
Formerly Geniva/Oxford Bio Sciences Ltd.

Pow'r-Ject™ (see **Med-E-Jet™**)

Preci-Jet 50® (See **Advantajet**)
See: Theintz1990, Bareille1997, Denne1992, Inoue1996, Sugibayashi2000
Identical to **AdvantaJet®** etc. (see above)
Activa Brand Products, Mississauga, Ontario, Canada (successor to Equipement Moniteur, Inc., Montreal, Canada; then Advanced Medical Technologies, Charlottetown, Prince Edward Island, C1E 1B0 Canada; then Health-Mor Personal Care Corp. Bradley, Illinois)

Press-O-Jet (forerunner of **Ped-O-Jet**)
See: Warren1955 [photos], Hingson1957 [diagram], Anderson1958, Lipson1958, Barclay1962, Hingson1963, Lawton1964, Veronesi1966a, Welty1970,
Developed by: Joel Warren (WRAIR), F. Ziherl, A.W. Kish, and L.A. Ziherl
Made by Z. & W. Manufacturing Co., Wickliffe, OH; formerly Z&W Machine Products Company, Cleveland OH, Acquired in 1965 by Parker Hanifin Corporation (http://www.parker.com)
orifice = 0.003 - 0.005 inch = 0.076 - 0.127 mm
1 mL steel reusable chamber
Past distributors: Scientific Equipment Manufacturing Corporation, 20 North Avenue,

Larchmont, NY; Robbins Instruments, Inc., 2 North Passaic Ave. - Box 441, Chatham, NJ 07928, Tel: (201)635-8972, Fax: (201)635-8732

Pro-Jeey 2000
Heng Yang Weida Science Technology
550 West Bus Station Rd.
Heng Yang, China
Tel: +86 73-188-51991, +86 1-397-485593

Pulse™ 200 (see **HSI-500™**)
(veterinary use)

Schucojet™ (See Porton Jet)
SHUCO International London, Ltd., Lyndhurst Avenue, London, N12 0NE, Tel: +44 (0) 20 8368.1642, Fax: +44 (0) 20 8361.3761, Sales@schuco.co.uk, http://www.schuco.co.uk, http://www.schuco.co.uk/Information/Pages/Injector%20Info.asp , http://www.schuco.co.uk/Information/SchucoJet%20Parts%20List.pdf

Sensa-Jet™
Genesis Medical Technologies, Inc.
Robert E. Jones, President/Director, Suite 400B, 1600 Downing Street, Denver, CO 80218, Tel: 303-832-4909, Fax: 303-832-4919, cell 303-472-2997, genmed@idt.net
Press release: http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/12-22-1998/0000831767&EDATE=

SeroJet™ (see **Cool.Click®**)

ShimaJET
See: Konishi2003, Imoto2005
Shimadzu Corporation, Kyoto, Japan (http://www.shimadzu.com)
www.shimadzu.co.jp/ep/other/shimajet/shimajettop.html
http://asiacorpnet.com/Article.Asp?Art_ID=27556
http://www.shimadzu.co.jp/ep/other/shimajet/other/sjkousei.html

SICIM DG-77 ™ and **JET-2000** models
See: Consoli1984, Resman1985, Hoffman2001 (injector C)
SICIM s.p.a., Via Aquileia, 94, 34076 Romans d'Isonzo (Gorizia) Italy,
Tel: 39 481 90188/ 39-481 90332, Fax: 39 481 90332)

SNAP JET®
Cambridge Biostability, Ltd.. Sumpter House, 8 Station Road, Histon, Cambridge CB4 4LQ United Kingdom
Fax: [+44] (1223) 352-960

SQ-PEN™, SQ-X™

Medical House Products Limited, a subsidiary of The Medical House PLC
199 Newhall Road, Attercliffe, Sheffield, S9 2QJ, UK.
tel: +44 (0)114 261 9011, fax: +44 (0)114 243 1597, info@sq-pen.com

Swiss Injector®, EMS/MPM, EMS/RPM

See: Cartier2000, Ren2002, Walther2002, Janouskova2003
EMS Electro Medical Systems, Ch. de la Vuarpillière 31, CH-1260 Nyon, Switzerland, Phone +41 22 99 44 700, Fax +41 22 99 44 701, E-mail: welcome@ems-ch.com, http://www.ems-medical.com, http://www.ems-dent.com
EMS Medical GmbH, Obere Laube 44, 78462 Konstanz, Germany, Tel: +49 7531 12860, Fax +49 7531 1286286, info@ems-medical.de

Syrijet, **Syrijet Mark IV** (see **Avijet**)

See: Welty1970, Bennett1971a, Bennett1971b, Bennett1972a, Bennett1972b, Greenfield1973, Mott1973, Mott1974, Frymire1974, ElGeneidy1974, Hardison1977, Danowski1978, Denne1992, Ellis1993, Grau1997, Weintraub1998, Hawkins2002, Lundholm2002,
Mizzy, Inc. - Keystone Industries, Cherry Hill, NJ, 616 Hollywood Avenue, Cherry Hill, NJ 08002, Tel: 609-663-4700, Fax: 609-663-0381, nkeystone@aol.com
(Formerly, Mizzy, Inc., New York, New York, and Clifton Forge, Virginia, USA)

Tender Touch

See: Jovanovic-Peterson1993)
See: **Medi-Jector**, above
Derata Corporation, Derata, MN

Twinjector EZ

See: Suzuki1995
Japan Chemical Research

VACCI-JET (see **Dermo-Jet**)

See: Krantz1970.

Vaccijet électrique, Vaccijet manuel

Endos Pharma, Laons, France (technology absorbed into Antares Pharma)

Velodermic™

See: Coon1954, Hingson1957, Bremseth2001
Becton, Dickinson & Company, Franklin Lakes, NJ (formerly of Rutherford, NJ)

Vitajet® , **Vetjet™** (See **Biojector**, above)

See: Katoulis1989, Rayman1989, Jackson2001, Schramm2002, Giudice2006
http://www.vitajet.com/
Vitajet Corporation,

27071 Cabot Road, Suite 110, Laguna Hills, CA 92653,
714-582-0713, 800-848-2538)
Vitajet Industria e Comercio
Rio de Janeiro, Brazil
1998-99: became subsidiary of Bioject, Inc. See **Biojector® 2000**
Vetjet™ is licensed to Merial for delivery to cats of Purevax™ brand of feline leukemia virus vaccine

Wand
Milestone Scientific
See: Zarzecka2006

(Genotropin®) ZipTip (identical device to Equidyne **INJEX**®, see above)
See: Dorr2003 Dörr2003
Needle-free injection system for use with Genotropin® recombinant human growth hormone (somatropin).
Drug manufactured by Pharmacia AB, Stockholm, Sweden for Pharmacia & Upjohn Company, a subsidiary of Pharmacia Corporation, Kalamazoo, MI 49001, USA (Pharmacia merged into Pfizer in 2003).

Z&W Manufacturing Company
See: Warren1955 [photos], Hingson1957, Hingson1963
See: **Press-O-Jet**
Z&W Manufacturing Company, 1951-1958,
multidose JI
electric powered spring compression, hand-pump syringe compression,

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GENERAL / MISCELLANEOUS RESOURCES

The Brother's Brother Foundation
(Founded by Robert Hingson, father of jet injection)
1501 Reedsdale Street, Suite 3005

Pittsburgh, PA 15233-2341
Phone: (412)321-3160, Fax: (412) 321-3325, BBFound@aol.com
http://www.brothersbrother.org/

CDC webpage on needle-free jet injection technology
http://www.cdc.gov/nip/dev/jetinject.htm

Needle-free Injection Technology News Service
http://vaxdev.forum.cdc.gov

Origins of jet injection experience in USA

Arnold Sutermeister, mechanical engineer noticed injections of diesel oil into workmen hands via pinholes in high-pressure oil lines. Clinical involvement by Dr. Robert Hingson, assigned to Public Health Service Hospital, Staten Island, New York City. Sutermeister and surgeon John F. Roberts developed prototype jet injector in 1933. See Pollack1971, Hingson1989.

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