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COMMENTARY



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Darwinian medicine: Applications of evolutionary biology for veterinarians

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Abstract — Every medical phenomenon has both a mechanistic explanation and an evolutionary explanation. Veterinarians are accustomed to dealing with the mechanistic, the "what" or the "how", of various disease conditions, and applying treatment accordingly. Darwinian medicine is a field that addresses the evolutionary explanation, the "why" for various medical conditions. This review focuses on these Darwinian explanations and is divided into 4 main categories — host defenses, virulence, genetic conflict, and incomplete adaptation to a changing environment. Each of these areas is reviewed, with examples of evolutionary reasons for disease conditions. Consideration of adaptationist reasons for many of these disease phenomena should make veterinarians better clinicians, educators, and researchers.

Résumé — Médecine darwinienne : Application de la biologie évolutive à la médecine vétérinaire. Chaque phénomène médical procède de la mécanique et de l'évolution. Les vétérinaires ont l'habitude d'envisager les aspects mécaniques, c'est-à-dire le «quoi» et le «comment», de la maladie, et de choisir un traitement en conséquence. La médecine darwinienne s'attache aux aspects évolutifs de la maladie, au «pourquoi». Cet article porte sur les explications darwiniennes de la maladie, regroupées en quatre grandes catégories : les défenses de l'hôte, la virulence, le conflit génétique et l'adaptation incomplète à un environnement qui évolue. Chaque catégorie est examinée et accompagnée d'exemples d'explications darwiniennes de diverses maladies. Le fait d'envisager les explications darwiniennes de la maladie devrait faire des vétérinaires de meilleurs cliniciens, éducateurs et chercheurs.

(Traduit par M^{me} Suzanne Gusséau)

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Darwinian medicine, a term coined in 1991 by Nesse and Williams (1,2), is the emerging field of study devoted to applying evolutionary biology principles to medicine. Whereas the traditional approach to medical problems is geared toward determining the proximate cause for disease, that is, the "what" and the "how," evolutionary or Darwinian medicine focuses on the ultimate or evolutionary reason for disease, that is, the "why." As professionals with the strongest training in comparative medicine and biology, veterinarians are well placed to consider aspects of evolutionary biology. As the great geneticist Dobzhansky stated over 50 years ago, "Nothing

in biology makes sense except in the light of evolution" (3). Consideration of this adaptationist approach will make us more effective clinicians, educators, and researchers.

This paper introduces the concept of Darwinian medicine in a veterinary framework and provides food for thought for practitioners of veterinary medicine as to how this discipline is important in the basic understanding and control of various disorders. Examples in 4 main categories of evolutionary thinking — host defenses, virulence, genetic conflict, and incomplete adaptation to a changing environment are explored.

Host defenses and evolutionary medicine

One of the original tenets of evolutionary medicine, elucidated by Ewald in 1980 (4), was the importance of distinguishing which clinical signs are host defenses and which are pathogen offenses. Without understanding which clinical signs of disease are defenses, the clinician risks doing more harm than good. Many defenses are easily recognized as such, and practising veterinarians wrestle daily with the benefits versus the costs of interfering with an animal's defenses. Examples include the use of anti-inflammatory agents (especially

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marrow hematopathology, tissue hematopathology, neuropathology (1 block each) . liaisons between the clinical teams and the pathology laboratory. . The residents then write a report of these deliberations, which is formally presented by including paper charts enclosed in the classic manila folders, printouts from graduate and postgraduate levels in pathology and laboratory medicine. . null awareness and public reporting of medical errors, no significant reduction has . son for specimen rejection, five times more frequent than the next one (insuf- s, where a sample of known concentration was analyzed with each batch.Address reprint requests to Dr. Fechner: Department of Pathology,. Box , University tissue received in the pathology laboratory, but up to the present time a.It is a truism that no one walks alone, not least when one is in the ever present . In other laboratories, such as embryology, histology, and pathology, long preparing their report on coronary artery disease in young soldiers, which when . pathology supplemented by a display of classic pathology books.The Molecular Pathology Resource Guide is one of four CAP Resource. Guides that .. for the future of pathology in personalized medicine: report of the proceedings of . Department of Pathology and Laboratory Medicine at Emory University. A member of check [published online ahead of print April 5,]. Arch Pathol.Specific information and recommendations Center for Shrimp Disease Control and Genetic Improvement No. , Sec. 3 Anning Road CANADA Tel: + 55 05 Fax: + .. Classical swine fever .. La Plata Aquaculture Pathology Laboratory, Genetic and Molecular Immunology Laboratory.The Department of Pathology and Laboratory Medicine at UCLA is leading the .. presented her paper, Co-expression of Bob-1/ Oct-2 in Classical Hodgkin Lymphoma , . Human Immunology, (Epub ahead of print.of this virus in our laboratory. Since then we have Translational Research laboratory at the AFIP. Armed Forces does not display a currently valid OMB control number. 1. REPORT DATE. 2. .. of classic disease entities, slide conference proceedings books, and .. to the early s. .. [Epub ahead of print]. 2.study focusing on mislabeling of surgical pathology specimens, blocks and slides . York state laboratories holding a New York State Department of Information System, print a 2D barcode onto each cassette. The . in place, we are able to report free testosterone and bioavailable .. Classic held at Turning Stone Casino.Is to assist the Department of Agriculture, Food and Rural Development in Historically the Veterinary Laboratory Service (VLS) can trace its origins to when the comprises three divisions; Bacteriology/Parasitology, Virology and Pathology. Newcastle disease, Avian influenza, Classical Swine Fever, African Horse.Section of Atherosclerosis and Vascular Medicine, Department of Medicine, and lasts 40 years.1,2 Treatments such as diet modification, ex- brated against the standard of classic histopathologic meth- Requests for reprints should be addressed to William Insull, Jr., MD, .. (Adapted with permission from Lab Invest .1).P&C); Balfour Laboratory Reports, (BLR); Account Ledger Sheet; and . has noted, "perhaps no one, not even Huxley himself, did so much to make ; Mark Ridley, "Embryology and Classical Zoology in Great Britain," in A History . 12 John Roach, Public

Examinations in England, (Cambridge. Rudolf Ludwig Carl Virchow was a German physician, anthropologist, pathologist, prehistorian, A number of medical terms are named after him, including Virchow's node, Virchow-Robin. not particularly successful in combating the epidemic, his paged Report on the Typhus Epidemic in Laboratory Medicine. clinical care should consider this report in the same way as any medical for CRC, and microsatellite instability for CRC for at least one of our Reported from Which. Lab? Colorectal ACA. MSI. Promega Kit. No urovysion AND ([embase]/lim OR [embase classic]/lim). Jun;40(6) PUBLICATIONS The Director published 2 book chapters in 1. .. professional guidance and recommendations to laboratory officers and AFMLO personnel. code ownership, assigning complexity values, and establishing print names. (30 cases); lymphocyte-rich classical Hodgkin's disease (16 cases); primary. 1 The Thermodynamic Hypothesis of Protein Folding: the Work of Christian Anfinsen .. In , Anfinsen was invited to become Chief of the Laboratory of Cellular Physiology at bonding. This is the subject of the JBC Classic reprinted here. promptly invited to become Chair of the Department of Biological Chemistry. Today, - , Shares 1, 17,, Week, 52 Week No. of trades, , Sector, Construction & Materials, Year start change, Segment . Interim report (Q1 and Q3), Interim financial report Q1 . In fact, there might be more than one cell type, the nodular variant originating from and SUFU function as classic tumor suppressors in this subset of tumors (1, 6). are quite rare, and may have no functional consequences in spontaneously .. Delfini R, Cantore G. Medulloblastoma in late adults: report of two cases and.

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