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PANOSIS: A NEW WORD OR A FORGOTTEN WORLD?

There is no evidence for the eyes that do not want to see but for the determined and eager heart willing to learn and understand

Having always worked in the veterinary field, I had never seriously considered the potential role that antimicrobial-resistant bacteria released to the environment by livestock could play in plant health status.

In fact, I had no notion whether the use of antibiotics for crop protection was significantly widespread or what legal framework, if any, applied to the issue within the European Union (E.U.), the United States of America (U.S.), and other developed countries.

Having observed that streptomycin and tetracycline (1) have been two of the molecules of choice in agriculture for decades and noticing the lack of E.U. and U.S. federal legislation concerning these substances, including banning them for this purpose, I realized that a more global explanation of the origin of the growing resistance of some animal

and human microbes relating to the effects of malpractice in agriculture on veterinary therapeutics and human medicine treatments was necessary.

These thoughts led me down paths that had little to do with my original idea as I wondered whether any of the plant bacterial pathogenic species would equally be capable of affecting vertebrate animals and humans.

I checked various lists of the major causative agents of plant diseases and reached a startling conclusion: some microorganisms are responsible for infections and morbid processes in both the vegetable and animal kingdoms, derived from their similar molecular basis and mechanisms of pathogenesis. That is the case for different Gram-negative rods, such as *Pseudomonas aeruginosa* and *Burkholderia cepacia*, as well as the Deuteromycete fungus *Aspergillus niger* (Table 1), demonstrating that flora and fauna, including humans, represent not separate, independent worlds but two interacting sides of the same reality.

These shared pathogenic conditions whose connections were never studied in a comprehensive way also generate a more complex topic: a new term must be coined for infections that living

TABLE 1. Infections common to plants, vertebrate animals, and humans

Microbe	Transmissible infection/disease cited in literature		
	Plants	Animals	Humans
<i>Pseudomonas aeruginosa</i> ^{a,b,c} (transmissible through direct contact and aerosols)	Infections in tomato, lettuce, onion, and tobacco (2–4)	Mastitis, enteritis, pneumonia, cystitis, endocarditis, dermatitis, conjunctivitis, and wound infections in several species (5)	Pulmonary complications in cystic fibrosis (6) and an opportunistic human pathogen (7)
<i>Burkholderia cepacia</i> ^{a,b,c} (transmissible through direct contact and aerosols)	Rot of onions known as slippery skin (8)	Mastitis in sheep (9)	Pulmonary complications in cystic fibrosis, nosocomial infections and infections in immunosuppressed individuals (10), and faringitis (11)
<i>Aspergillus niger</i> ^{a,b,c} (infection acquired by inhalation)	Black mold disease (12)	Abortions in bovines (13) and pulmonary aspergillosis in ruminants (13, 14) and poultry (13)	Pulmonary aspergillosis (15)

^a When solely plants and animals, not humans, are involved it should be considered a zoophytonosis.

^b When solely plants and humans are involved it should be considered an anthropytonosis.

^c When plants, animals, and humans are involved it should be considered a panosis or an anthropozoochytonosis.

plants, and not merely stored vegetable by-products or contaminated decomposing matter, can pass to vertebrate animals and humans acting as bioconcentrators and biomagnifiers.

According to the World Health Organization, zoonosis [Gr. ζῷον (animal) + νόσος (disease)] (1959) and anthroozoonosis [Gr. ἄνθρωπο (man) + ζῷον (animal) + νόσος (disease)] can be defined as any disease and/or infection that is naturally transmissible from vertebrate animals to humans. Rudolf Virchow (1821–1902) conceived the word in the 19th century, more than 150 years ago, when he was investigating several aspects of *Trichinella*.

Unfortunately, the previously described examples represent a new concept of global infection for which a new name must be proposed or suggested, an acceptable etymological contribution being “panosis” [Gr. παν (all/inclusive/encompassing) + νόσος (disease)] as a synonym for anthropozoochytonosis [Gr. ἄνθρωπο (man) + ζῷον (animal) + φυτόν (plant) + νόσος (disease)] if direct and equivalent to phytozooanthroponosis for the reverse. Perhaps this is the missing link in an overall approach to the matter that may open a door to novel possibilities in systematically researching this model that has remained unexplored until the present, becoming a source of unpredictable challenges.

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