





**The Origin of the Social Impulse:  
E.O. Wilson's Recent and Controversial  
Rejection of Kin Selection in Historical Context**

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NATURE OUTLOOK PARKINSON'S DISEASE

26 August 2010 | www.nature.com/nature | £10

THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

# nature



## SOCIAL SERVICES

How standard natural selection explains the evolution of eusociality





## Altruism researchers must cooperate

Biologists studying the evolution of social behaviour are at loggerheads. The disputes — mainly over methods — are holding back the field, says **Samir Okasha**.

# Outline

- 1. Wilson's intellectual pedigree
- 2. Wilson's early career
- 3. Kin selection controversy

# Charles Darwin



- British naturalist
- *On the Origin of Species* (1859)
- Considered social insects “by far the most serious **special difficulty**” for his theory

# Charles Darwin



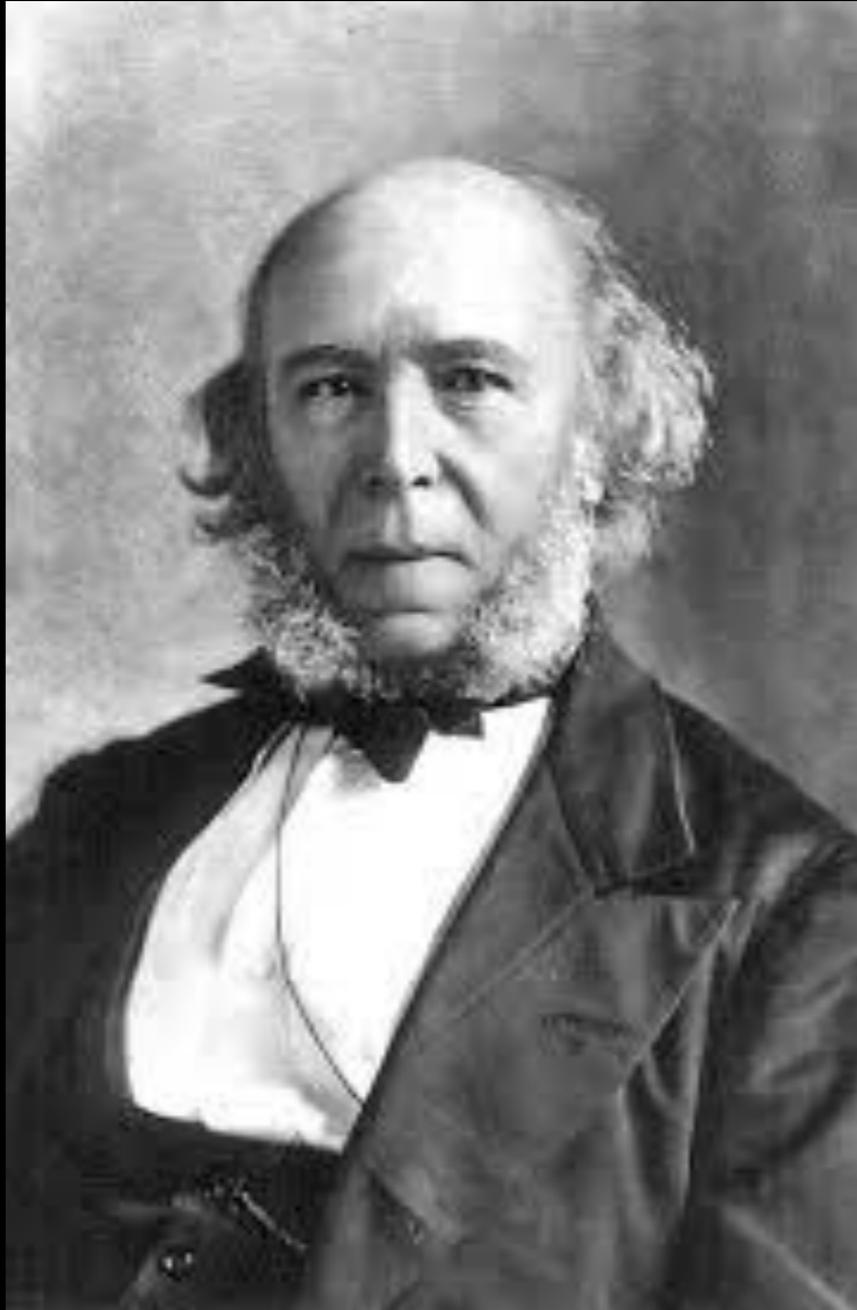
- “This difficulty, though appearing insuperable, is lessened, or, as I believe, disappears, when it is remembered that selection may be applied to the **family**, as well as to the individual, and may thus gain the desired end”

# Charles Darwin



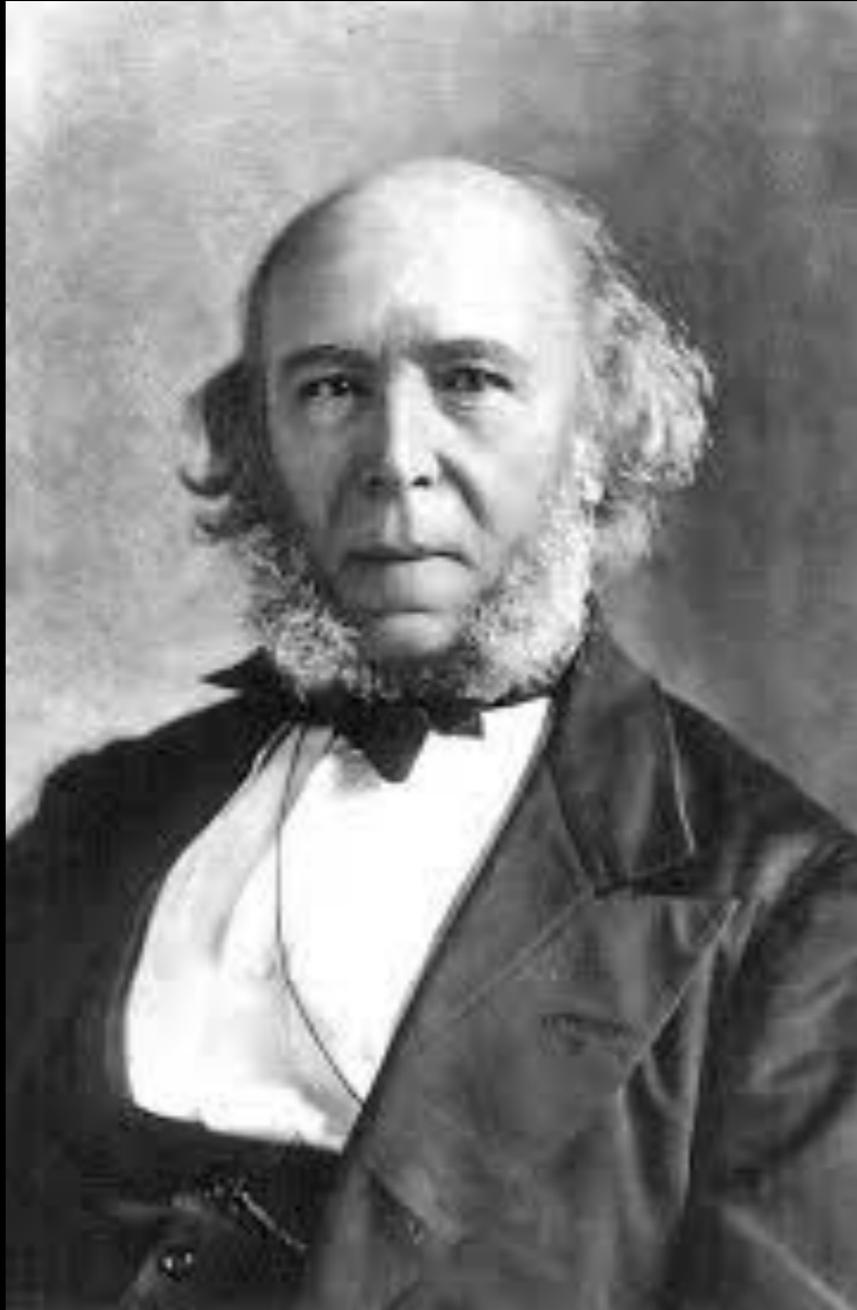
- “As long as it had been profitable to the **community** that a number should have been annually born capable of work, but incapable of procreation, I can see no very great difficulty in this being effected by natural selection”

# Herbert Spencer



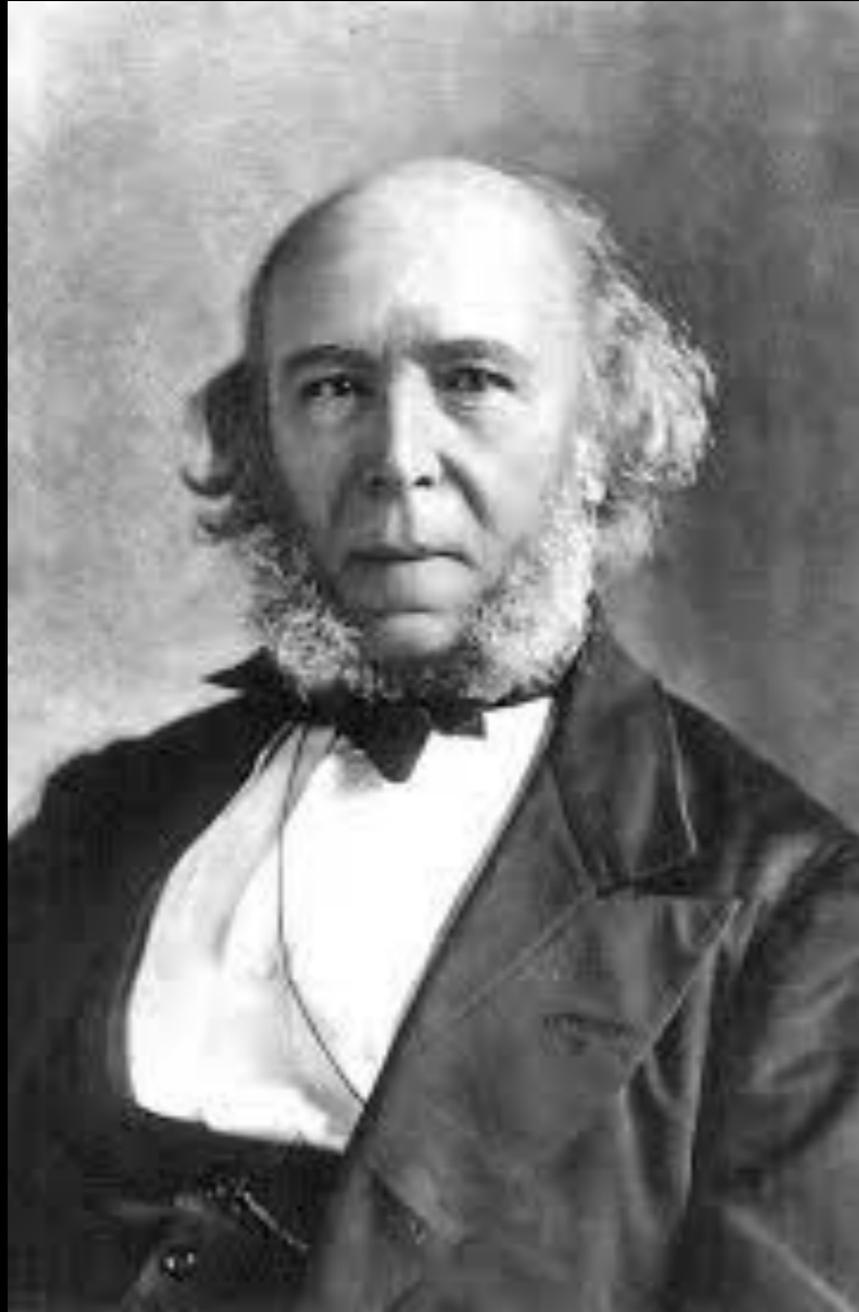
- British philosopher
- Social Darwinism
- Inheritance of acquired characteristics

# Herbert Spencer



- “The Social Organism” (1860)
  - Societies grow larger
  - They grow more complex
  - Division of labor

# Herbert Spencer



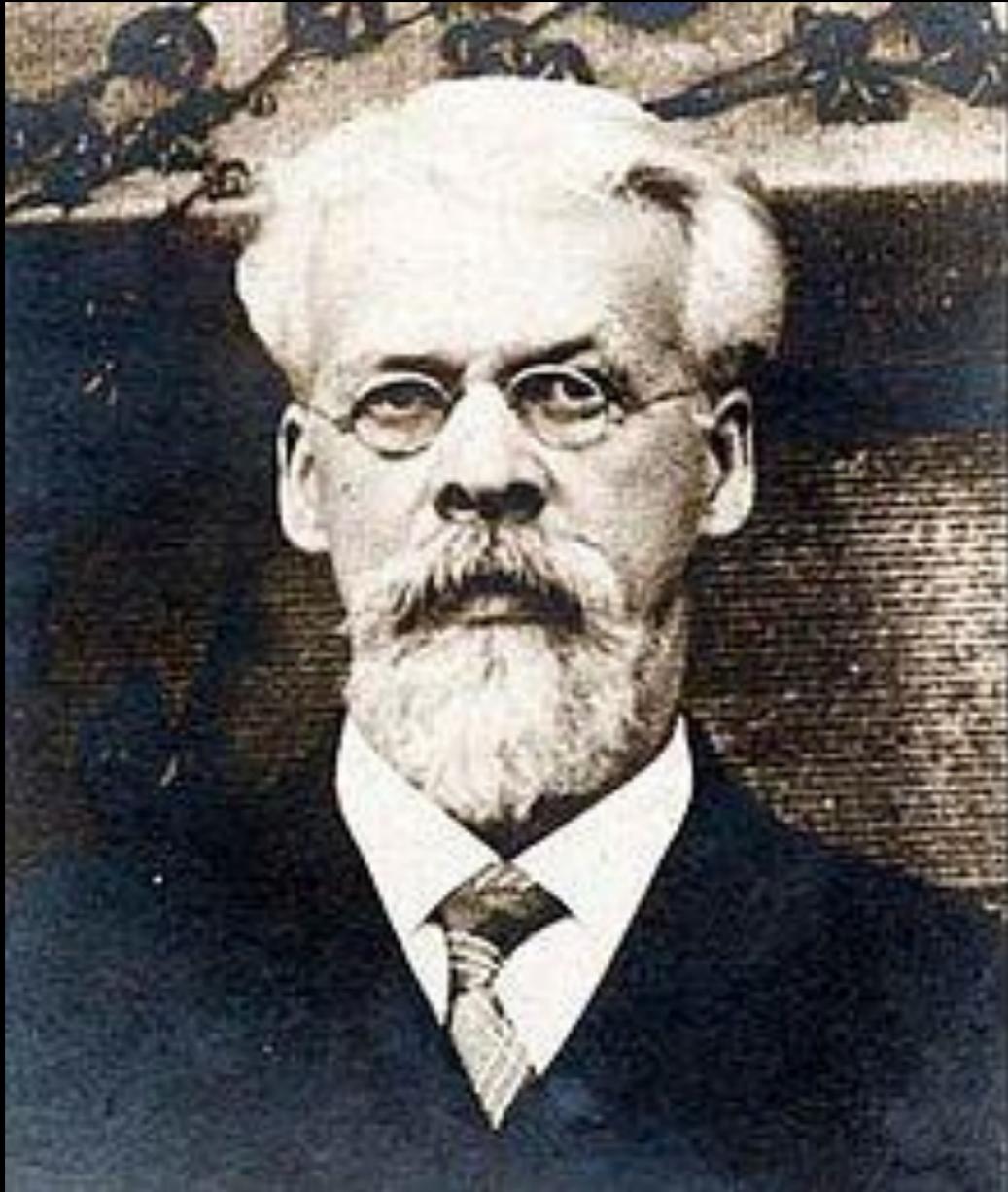
- “There exist various groups of **super-organic** phenomena... including all those processes and products which imply the coordinated actions of many individuals – coordinated actions which achieve **results exceeding in extent and complexity** those achievable by **individual actions.**”

# Charles Otis Whitman



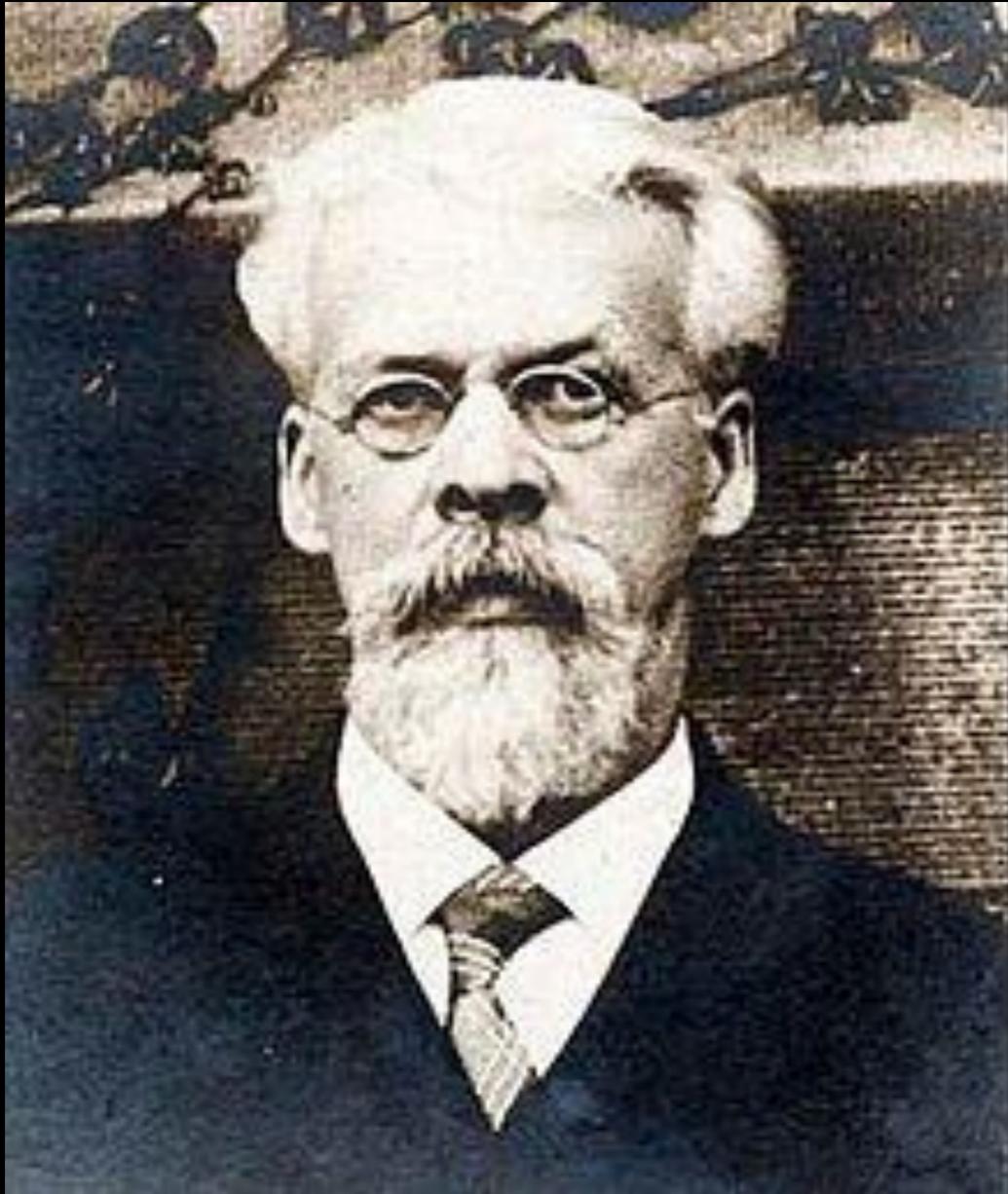
- American zoologist
- Marine Biological Laboratory
- Journal of Morphology

# Charles Otis Whitman



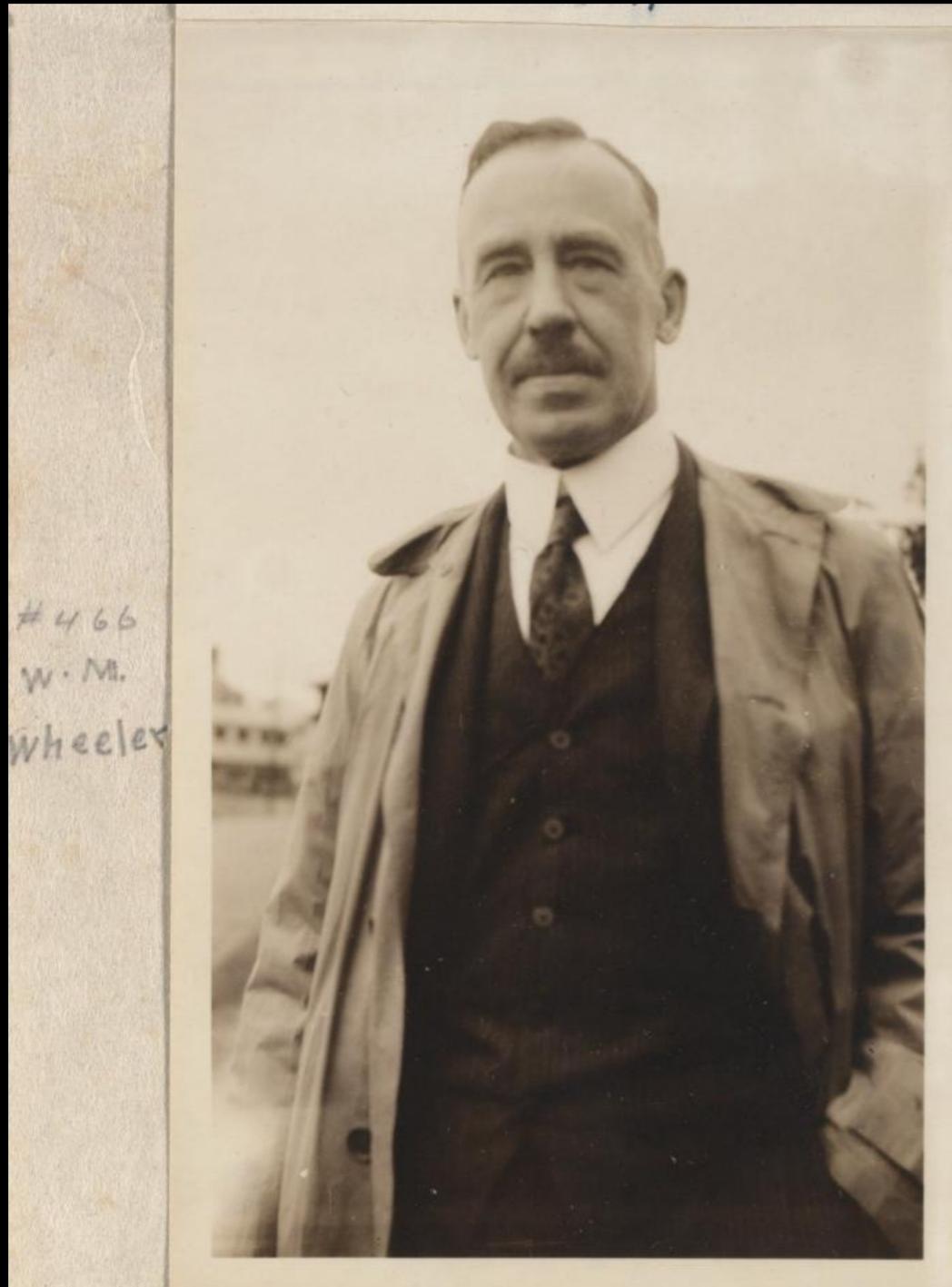
- “On the same grounds that the sociologist affirms that a society is an organism, the biologist declares that an **organism is a society.**”

# Charles Otis Whitman



- “Comparative embryology reminds us at every turn that the **organism dominates cell formation**, using for the same purpose one, several, or many cells, massing its material and directing its movements, and shaping its organs, as if cells did not exist, or as if they existed only in complete subordination to its will”

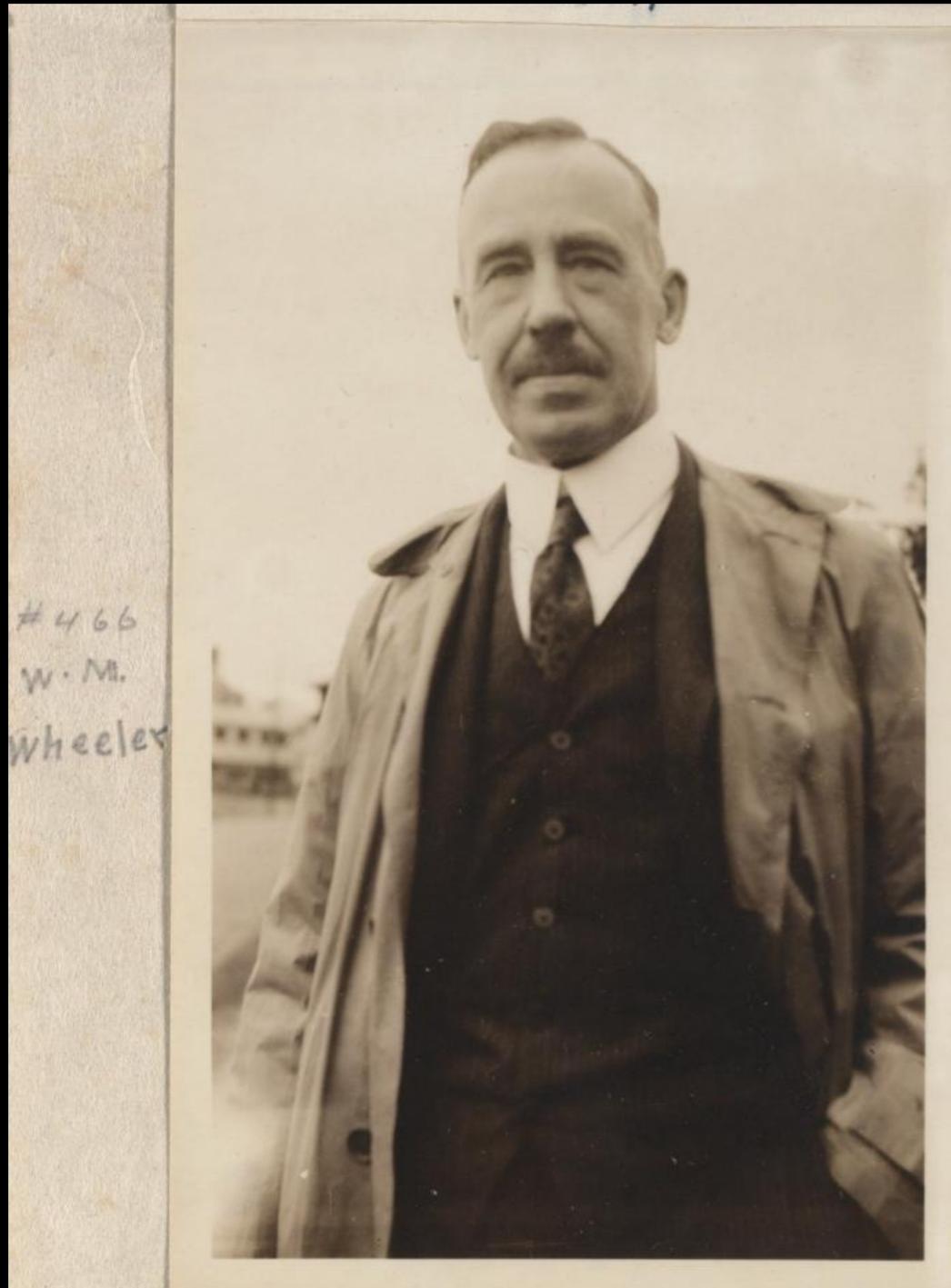
# William Morton Wheeler



#466  
W. M.  
Wheeler

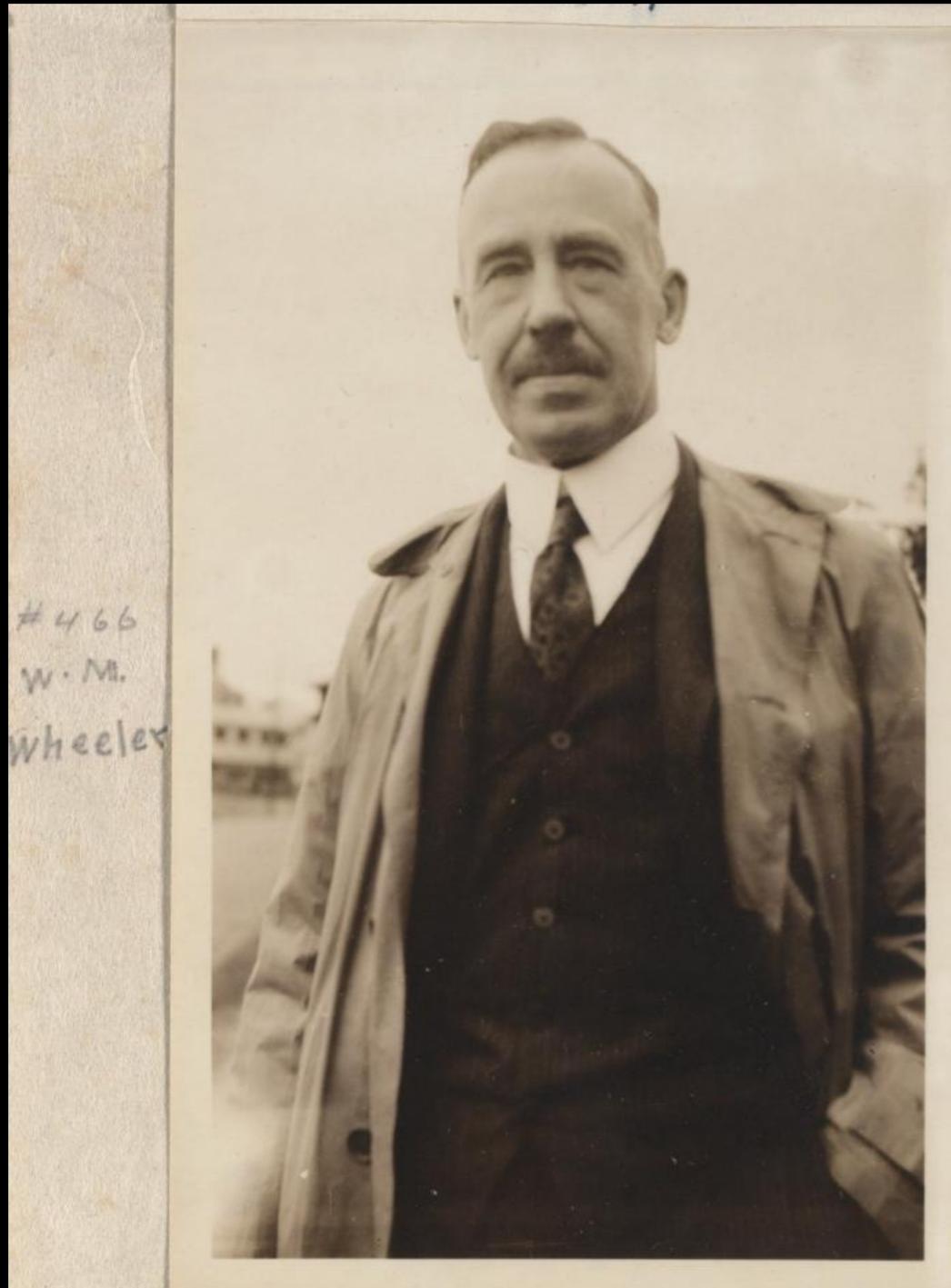
- Harvard biologist
- Ant expert

# William Morton Wheeler



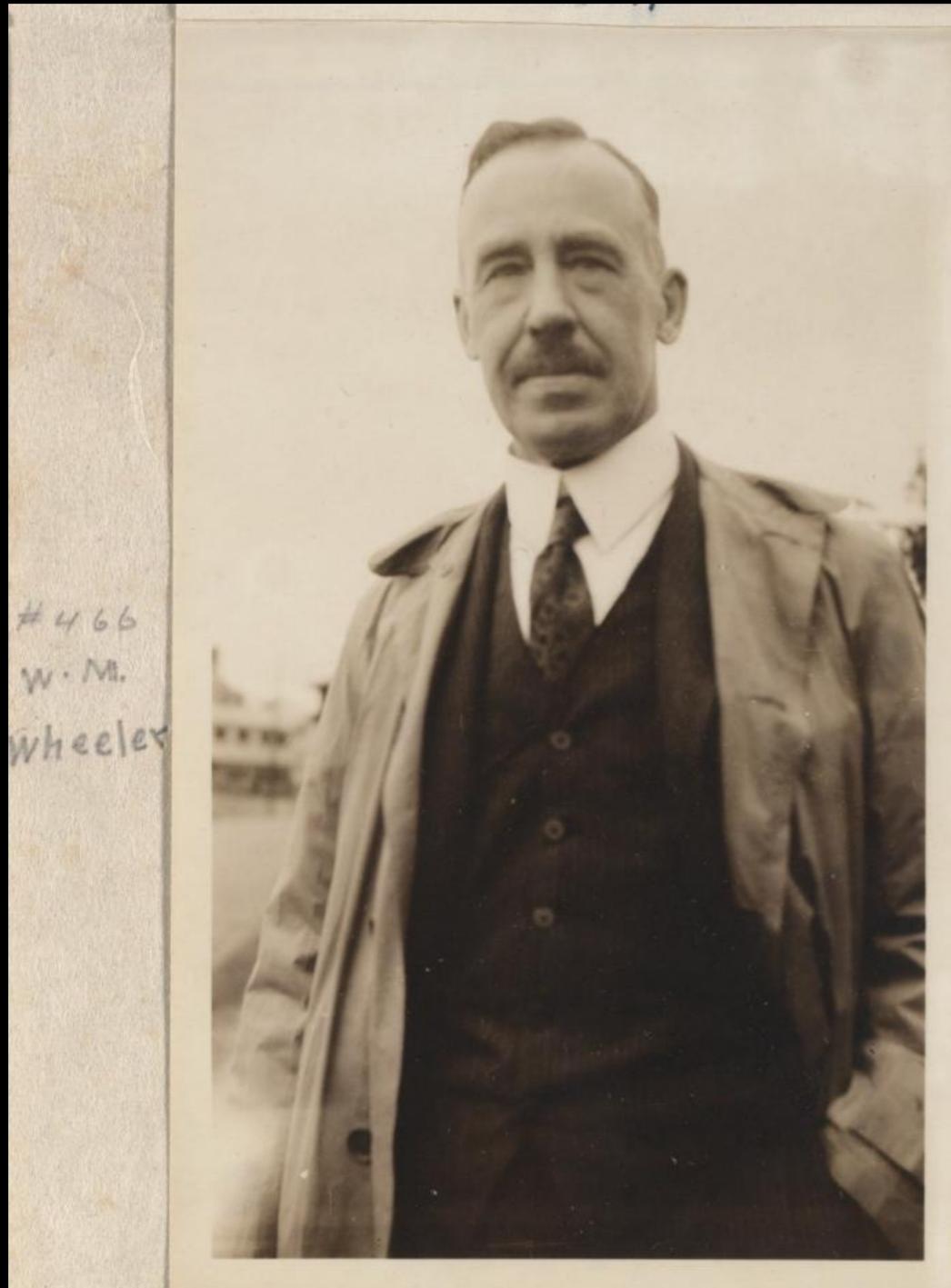
- “Ant Colony as Organism”
  - Acts as unitary whole
  - Reproductively differentiated
  - Ontogeny and phylogeny
- “the colony is a **true organism** and not merely the analogue of the person”

# William Morton Wheeler



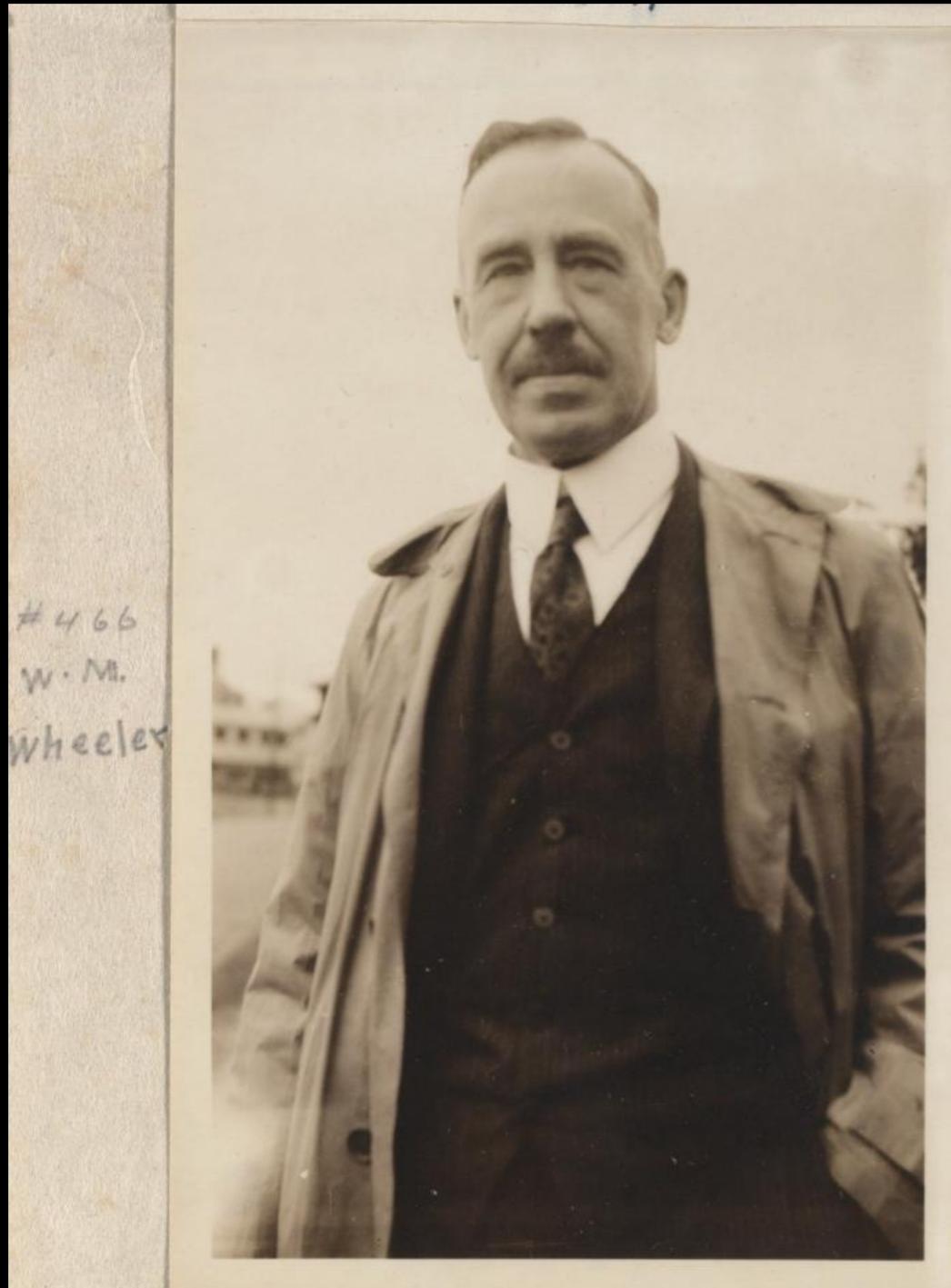
- Emergence: “a novelty of behavior arising from the specific **interaction or organization** of a number of elements, whether inorganic, organic, or mental, which thereby constitute **a whole, as distinguished from their mere sum**, or ‘resultant.’”

# William Morton Wheeler



“These sections are called **levels**. The word is not very apt since it conveys a special and static metaphor, whereas emergents must be regarded as intensively manifold spatiotemporal events.”

# William Morton Wheeler



“We are still confronted with the formidable question as to **what regulates the anticipatory cooperation**, or synergy of the colonial personnel and determines its unitary and individualized course.”

# Edward O. Wilson



16-year-old Wilson purchases  
a copy of William Morton  
Wheeler's *Ants* in 1945



# Reductionist “triumph”

- The synthesis (1936-1947)
- Watson and Crick (1953)
- Hamilton (1964)
- Maynard Smith (1964)
- George C. Williams (1966)

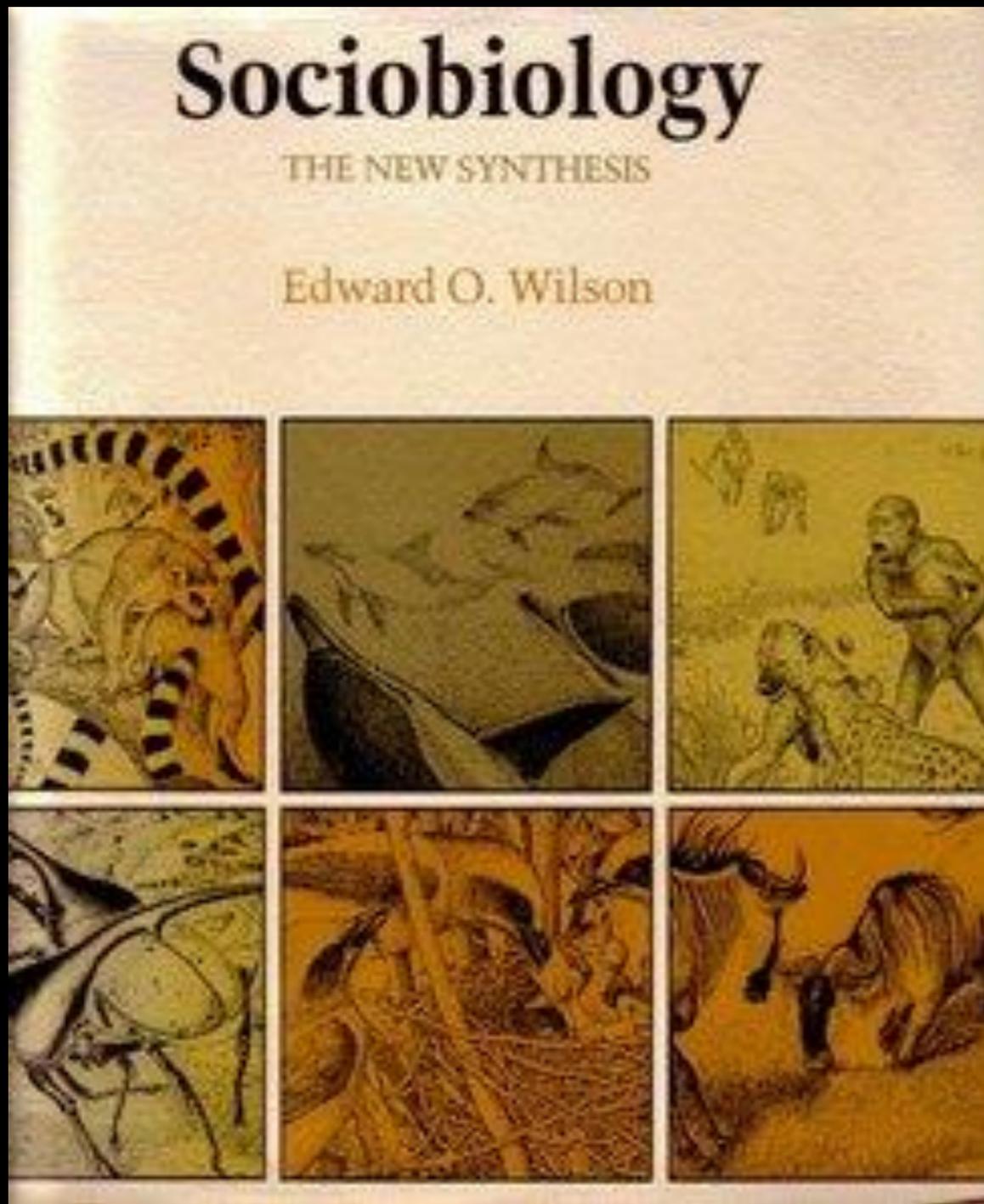


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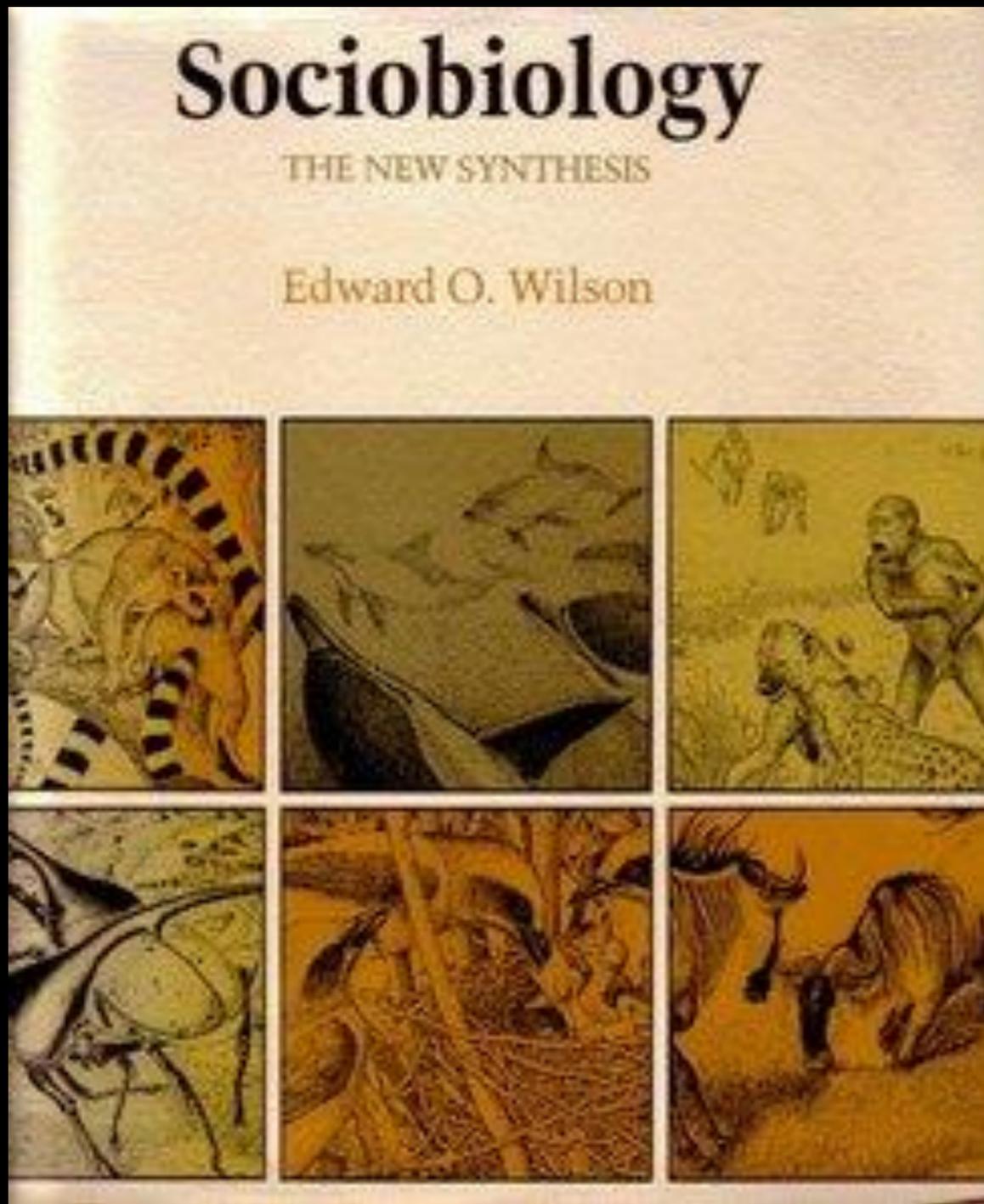


# Sociobiology



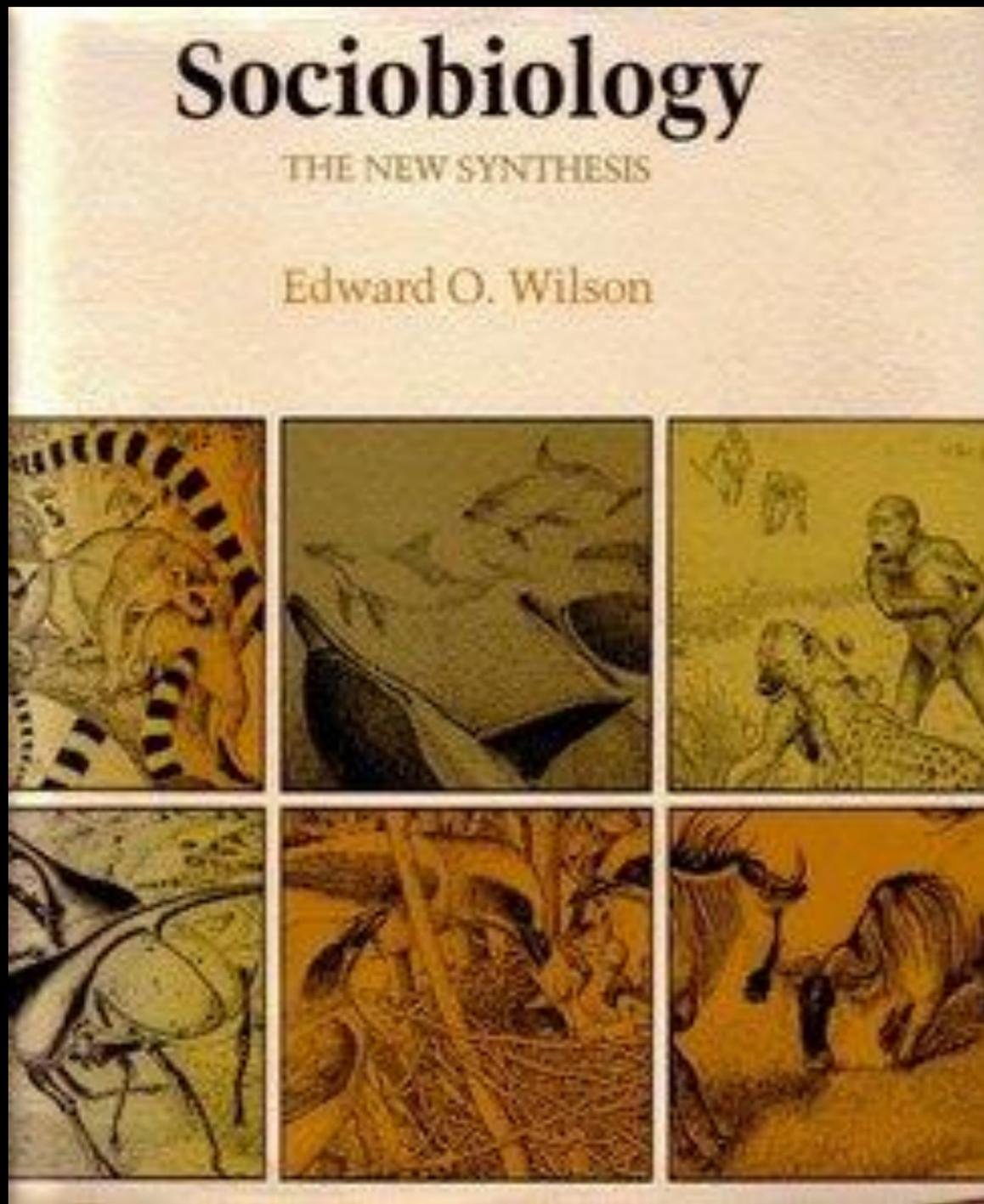
- Published in 1975
- Attempted to synthesize all social behavior among all living things

# Sociobiology



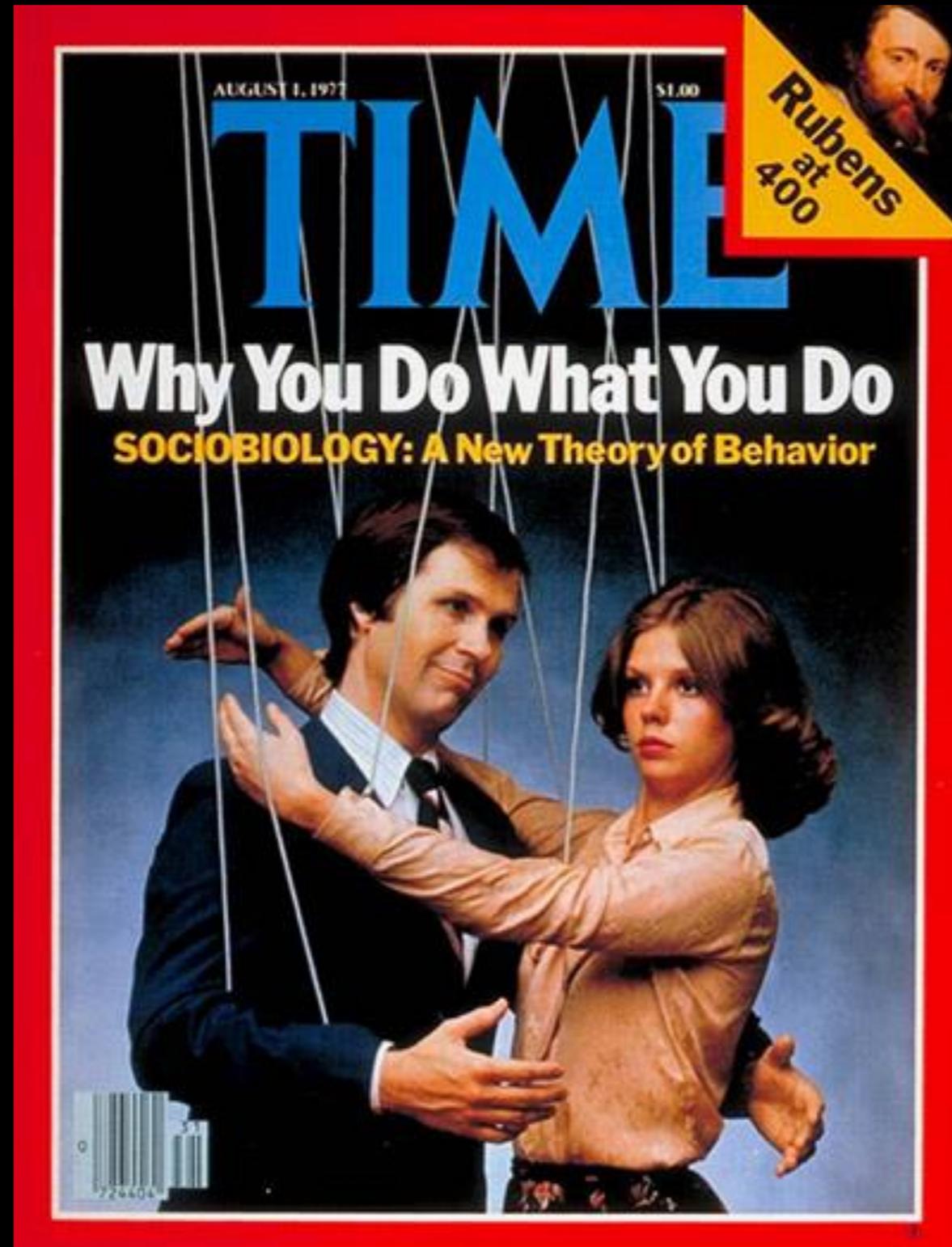
- “The organism does not live for itself. The organism is only DNA’s way of making more DNA.”

# Sociobiology



- “How can altruism, which by definition reduces personal fitness, possibly evolve by natural selection? **The answer is kinship**; if the genes causing the altruism are shared by two organisms because of common descent, and if the altruistic act by one organism increases the joint contribution of these genes to the next generation, the propensity to altruism will spread throughout the gene pool”

# Sociobiology





# Post-Cold War Resurgence of Emergence

- Leo Buss (1987)
- Eliot Sober and David Sloan Wilson (1989)
- Thomas Seeley (1989)
- Moritz and Southwick (1992)

*J. theor. Biol.* (1989) 136, 337–356

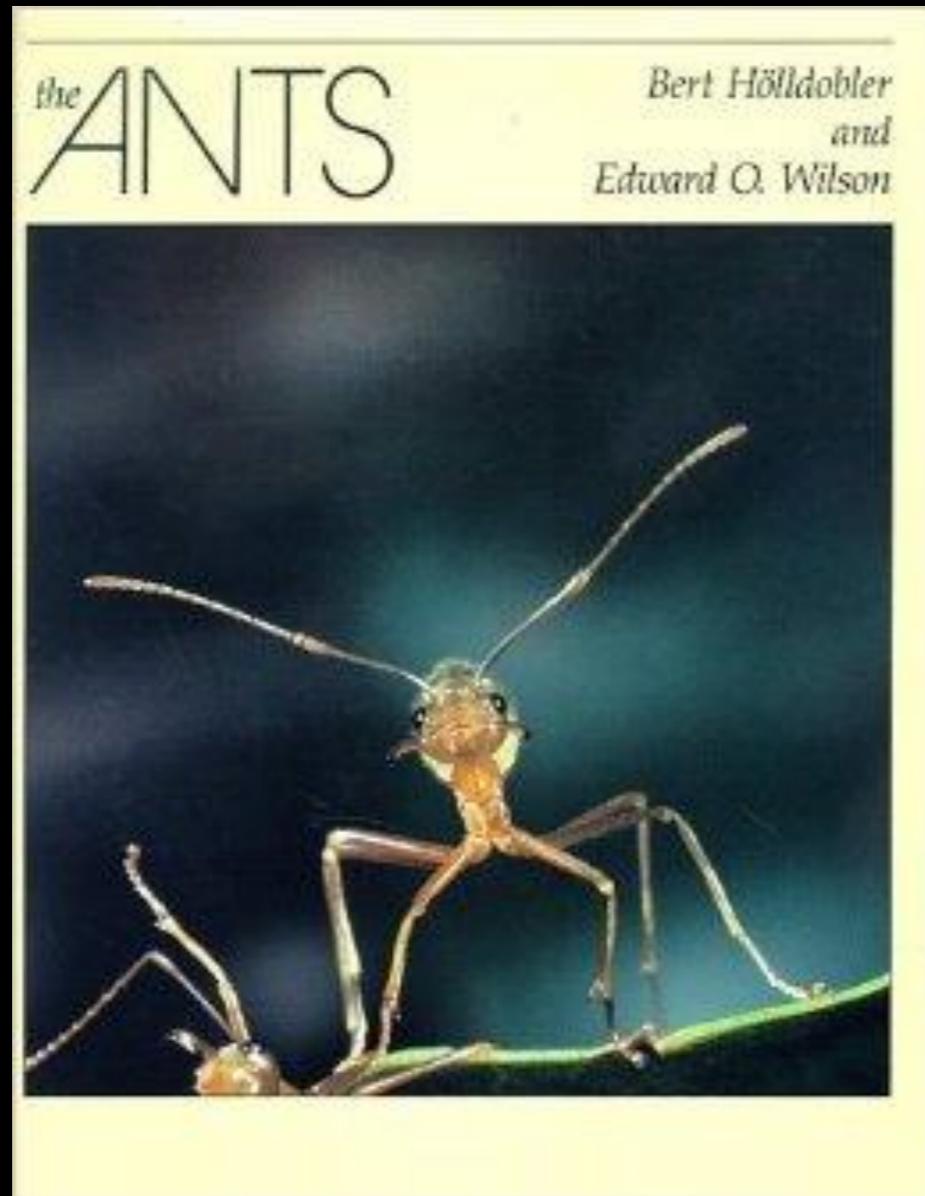
## **Reviving the Superorganism**

DAVID SLOAN WILSON AND ELLIOTT SOBER

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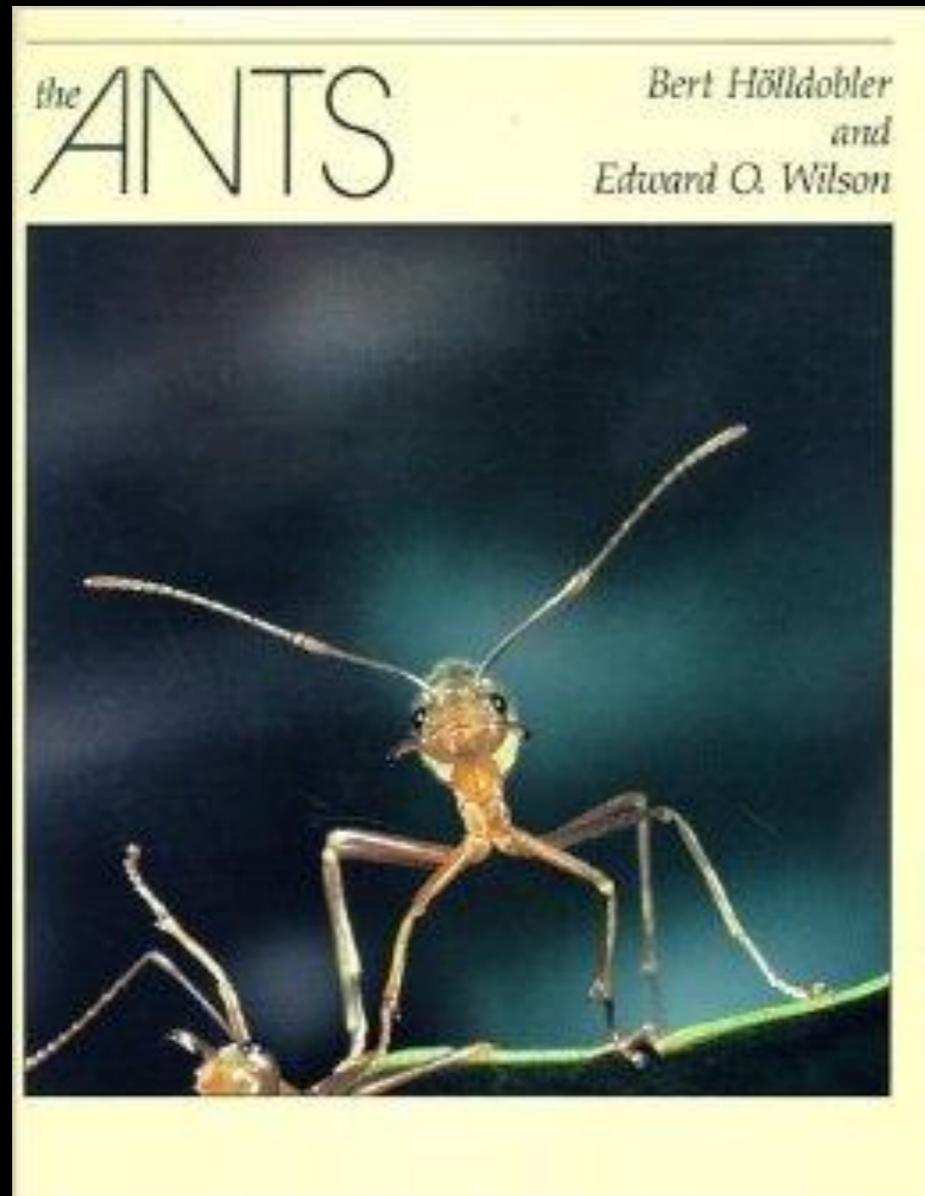
*(Received 25 July 1988, and accepted in revised form 18 October 1988)*

# Wilson and Hölldobler



- “The colony is the equivalent of the organism, the unit that must be examined in order to understand the biology of the colonial species.”

# Wilson and Hölldobler



- “**Kin selection** in ants can now be considered **fundamental** to sociobiology.”

# Rejecting Kin Selection



# Rejecting Kin Selection



- “**Relatedness does not drive** the evolution of **eusociality**.”
- “Natural selection targets the **emergent traits** created by the interactions of colony members.”

# Inclusive fitness theory and eusociality

ARISING FROM M. A. Nowak, C. E. Tarnita & E. O. Wilson *Nature* **466**, 1057–1062 (2010)

# Kin selection and eusociality

ARISING FROM M. A. Nowak, C. E. Tarnita & E. O. Wilson *Nature* **466**, 1057–1062 (2010)

# In defence of inclusive fitness theory

ARISING FROM M. A. Nowak, C. E. Tarnita & E. O. Wilson *Nature* **466**, 1057–1062 (2010)

# Only full-sibling families evolved eusociality

ARISING FROM M. A. Nowak, C. E. Tarnita & E. O. Wilson *Nature* **466**, 1057–1062 (2010)

# Inclusive fitness in evolution

ARISING FROM M. A. Nowak, C. E. Tarnita & E. O. Wilson *Nature* **466**, 1057–1062 (2010)

## The descent of Edward Wilson

A new book on evolution by a great biologist makes a slew of mistakes

by Richard Dawkins / May 24, 2012 / [Leave a comment](#)  
Published in June 2012 issue of Prospect Magazine

Patrick Abbot<sup>1</sup>, Jun Abe<sup>2</sup>, John Alcock<sup>3</sup>, Samuel Alizon<sup>4</sup>, Joao A. C. Alpedrinha<sup>5</sup>, Malte Andersson<sup>6</sup>, Jean-Baptiste Andre<sup>7</sup>, Minus van Baalen<sup>7</sup>, Francois Balloux<sup>8</sup>, Sigal Balshine<sup>9</sup>, Nick Barton<sup>10</sup>, Leo W. Beukeboom<sup>11</sup>, Jay M. Biernaskie<sup>5</sup>, Trine Bilde<sup>12</sup>, Gerald Borgia<sup>13</sup>, Michael Breed<sup>14</sup>, Sam Brown<sup>5</sup>, Redouan Bshary<sup>15</sup>, Angus Buckling<sup>5</sup>, Nancy T. Burley<sup>16</sup>, Max N. Burton-Chellew<sup>5</sup>, Michael A. Cant<sup>17</sup>, Michel Chapuisat<sup>18</sup>, Eric L. Charnov<sup>19</sup>, Tim Clutton-Brock<sup>20</sup>, Andrew Cockburn<sup>21</sup>, Blaine J. Cole<sup>22</sup>, Nick Colegrave<sup>23</sup>, Leda Cosmides<sup>24</sup>, Iain D. Couzin<sup>25</sup>, Jerry A. Coyne<sup>26</sup>, Scott Creel<sup>27</sup>, Bernard Crespi<sup>28</sup>, Robert L. Curry<sup>29</sup>, Sasha R. X. Dall<sup>17</sup>, Troy Day<sup>30</sup>, Janis L. Dickinson<sup>31</sup>, Lee Alan Dugatkin<sup>32</sup>, Claire El Mouden<sup>5</sup>, Stephen T. Emlen<sup>33</sup>, Jay Evans<sup>34</sup>, Regis Ferriere<sup>35</sup>, Jeremy Field<sup>36</sup>, Susanne Foitzik<sup>37</sup>, Kevin Foster<sup>5</sup>, William A. Foster<sup>20</sup>, Charles W. Fox<sup>38</sup>, Juergen Gadau<sup>39</sup>, Sylvain Gandon<sup>40</sup>, Andy Gardner<sup>5</sup>, Michael G. Gardner<sup>41</sup>, Thomas Getty<sup>42</sup>, Michael A. D. Goodisman<sup>43</sup>, Alan Grafen<sup>5</sup>, Rick Grosberg<sup>44</sup>, Christina M. Grozinger<sup>45</sup>, Pierre-Henri Gouyon<sup>46</sup>, Darryl Gwynne<sup>47</sup>, Paul H. Harvey<sup>5</sup>, J. M. Hell<sup>48</sup>, Jürgen Heinze<sup>49</sup>, Heikki Helanterä<sup>50</sup>, Kim Hill<sup>51</sup>, Kim Hill<sup>52</sup>, Natalie Jiricny<sup>5</sup>, Rufus A. Johnstone<sup>20</sup>, E. Toby Kiers<sup>53</sup>, Hanna Kokko<sup>21</sup>, Jan Komdeur<sup>54</sup>, Daniel Kronauer<sup>56</sup>, Rolf Kümmerli<sup>57</sup>, Timothy A. Linksvayer<sup>58</sup>, Sébastien Lion<sup>59</sup>, James A. R. Marshall<sup>61</sup>, Richard McElreath<sup>62</sup>, Yannis Michalakis<sup>4</sup>, Richard E. Michod<sup>63</sup>, Douglas Mock<sup>64</sup>, Thibaud Monnin<sup>7</sup>, Robert Montgomerie<sup>65</sup>, Allen J. Moore<sup>17</sup>, Ulrich G. Mueller<sup>66</sup>, Ronald Noë<sup>67</sup>, Samir Okasha<sup>68</sup>, Pekka Pamilo<sup>69</sup>, Geoff A. Parker<sup>70</sup>, Jes S. Pedersen<sup>58</sup>, Ido Pen<sup>71</sup>, David Pfennig<sup>72</sup>, David C. Queller<sup>73</sup>, Daniel J. Rankin<sup>74</sup>, Sarah E. Reece<sup>23</sup>, Hudson K. Reeve<sup>33</sup>, Max Reuter<sup>75</sup>, Gilbert Roberts<sup>76</sup>, Simon K. A. Robson<sup>77</sup>, Denis Roze<sup>78</sup>, Francois Rousset<sup>79</sup>, Olav Rueppell<sup>80</sup>, Joel L. Sachs<sup>81</sup>, Lorenzo Santorelli<sup>5</sup>, Paul Schmid-Hempel<sup>82</sup>, Michael P. Schwarz<sup>41</sup>, Tom Scott-Phillips<sup>83</sup>, Janet Shellmann-Sherman<sup>33</sup>, Paul W. Sherman<sup>33</sup>, David M. Shuker<sup>84</sup>, Jeff Smith<sup>73</sup>, Joseph C. Spagna<sup>85</sup>, Beverly Strassmann<sup>86</sup>, Andrew V. Suarez<sup>87</sup>, Liselotte Sundström<sup>50</sup>, Michael Taborsky<sup>88</sup>, Peter Taylor<sup>30</sup>, Graham Thompson<sup>89</sup>, John Tooby<sup>90</sup>, Neil D. Tsutsui<sup>91</sup>, Kazuki Tsuji<sup>92</sup>, Stefano Turillazzi<sup>93</sup>, Francisco Úbeda<sup>94</sup>, Edward L. Vargo<sup>95</sup>, Bernard Voelkl<sup>96</sup>, Tom Wenseleers<sup>97</sup>, Stuart A. West<sup>5</sup>, Mary Jane West-Eberhard<sup>98</sup>, David F. Westneat<sup>99</sup>, Diane C. Wiernasz<sup>22</sup>, Geoff Wild<sup>100</sup>, Richard Wrangham<sup>101</sup>, Andrew J. Young<sup>17</sup>, David W. Zeh<sup>102</sup>, Jeanne A. Zeh<sup>102</sup> & Andrew Zink<sup>103</sup>

# Social Conquest of Earth

THE  
SOCIAL  
CONQUEST  
OF EARTH



EDWARD  
O. WILSON

WINNER of the PULITZER PRIZE

- “... science **journalist** Richard Dawkins...”

# Social Conquest of Earth

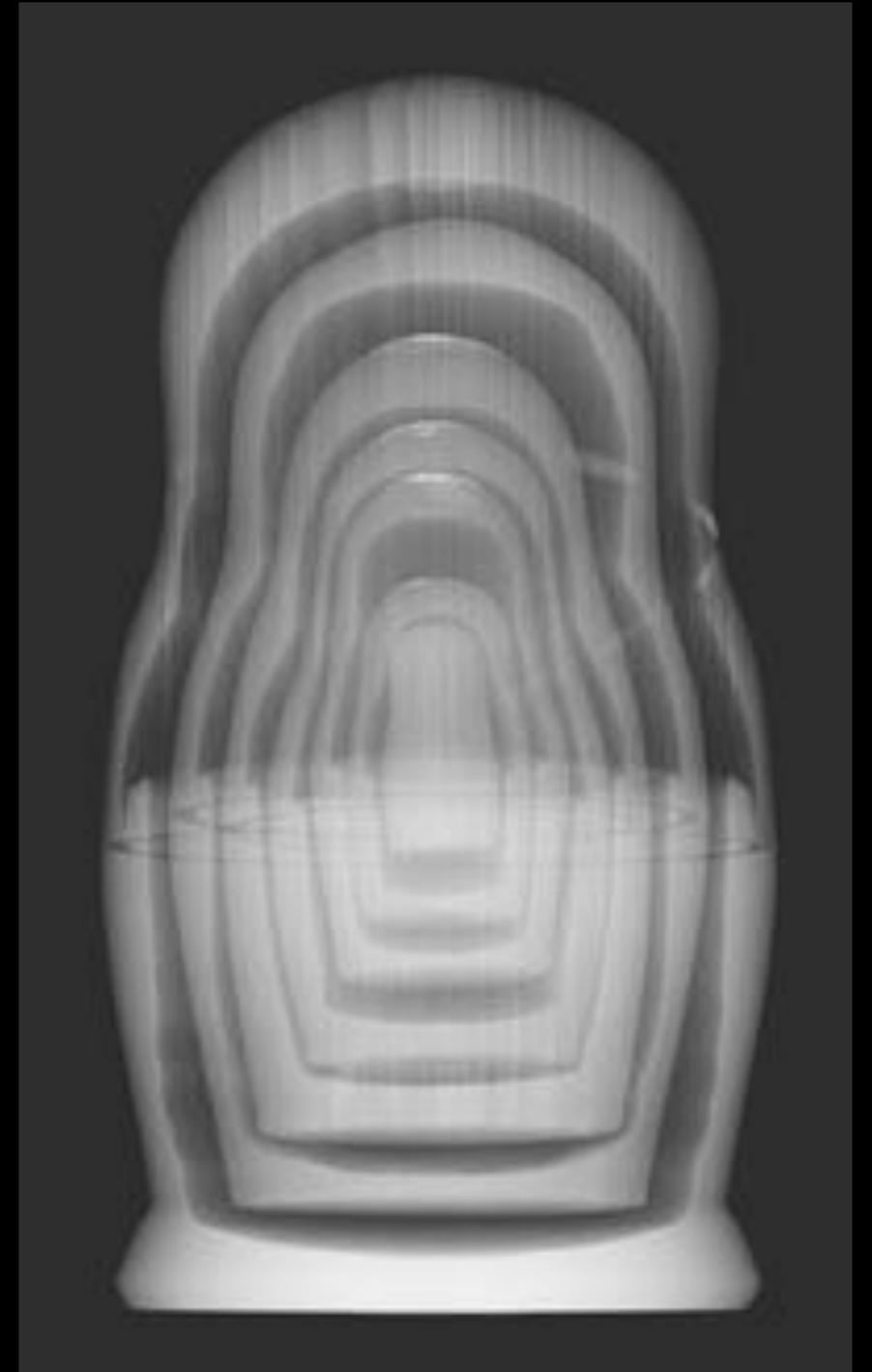
## THE SOCIAL CONQUEST OF EARTH



EDWARD  
O. WILSON

WINNER of the PULITZER PRIZE

- “It can be shown that **natural selection is usually multilevel** at least to some degree: its consequences at the level of the primary target trait reverberate up and down to other levels of biological organization, from molecule to population.”
- “Multilevel selection is **group and individual selection combined.**”



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W. M.  
Wheeler



