Appendix 4

***Comparisons of* Scientific American *and* New Scientist *Articles with Articles in* Science *or* Evolution**

Articles for Professional Audiences	*Articles for Popular Audiences*
1. K. Williams and L. Gilbert, *Science*, 1980	1. L. Gilbert, *Scientific American*, 1982
2. W. Garstka and D. Crews, *Science*, 1981	2. D. Crews and W. Garstka, *Scientific American*, 1982
3. G. Parker, *Evolution*, 1974	3. G. Parker, *New Scientist*, 1979
Titles	
1. "Insects as Selective Agents on Vegetative Morphology: Egg Mimicry Reduces Egg Laying by Butterflies"	1. "Coevolution of a Butterfly and a Vine"
2. "Female Sex Pheromeone in the Skin and Circulation of a Garter Snake"	2. "The Ecological Physiology of a Garter Snake"
3. "The Reproductive Behavior and the Nature of Sexual Selection in *Scatophaga stercoraria* L. (Diptera: Scatophagidae). IX. Spatial Distribution of Fertilization Rates and Evolution of Male Search Strategy Within the Reproductive Area."	3. "Sex Around the Cow-pats"
Abstracts	
1. "Experiments show that *Heliconius* butterflies are less likely to oviposit on host plants that possess eggs or egg-like structures. The egg mimics are an unambiguous example of a plant trait evolved in response to a	1. "*Heliconius* butterflies lay their eggs only on *Passiflora* vines. In defense the vines seem to have evolved fake eggs that make it look to the butterflies as if eggs have already been laid on them."

host restricted group of insect herbivores."

2. "Serums and extracts of tissue from the female garter snake (*Thamnophis sirtalis parietalis*) each act as a pheromone and elicit male courtship behavior when applied to the back of another male. Since pheromonal activity is present in the yolk and liver tissue of untreated females and can be induced with estrogen treatment in serums and livers of males, the pheromone may be associated with circulating yolk lipoprotein, vitellogenin."

3. No abstract.

2. "In order to survive the harsh environment of western Canada the red-sided garter snake has evolved a precisely-timed cycle of physiology and behavior with several spectacular features."

3. "Careful observation of dungflies as they mate on and around cowpats reveals that they use sophisticated strategies in maximising their reproductive success."

Introductions

1. "The idea of coevolution between insects and plants is attractive to biologists attempting to account for patterns of plant chemistry and the use of plants by insects (1). However, it is difficult to demonstrate a causal connection between a plant characteristic and a particular selective agent."

2. "In many vertebrates, urine, feces, and vaginal contents, as well as exocrine glandular products, function as sex attractants and serve to facilitate the location and recognition of males (1). We now report an additional source for a vertebrate sex hormone."

1. "Perhaps the most significant category of ecological interactions in terms of the net transfer of energy in the global food web is the interactions between plants and animals."

2. "The red-sided garter snake is found further north than any other reptile in the Western Hemisphere. It ranges into western Canada, where the winter temperature is often below −40° Celsius and the snow cover often continuous from late September through May.

3. "The present series of papers is aimed towards constructing a comprehensive model of sexual selection and its influence on reproductive strategy in the dungfly, *Schatophaga stercoraria*. The technique used links ecological and behavioral data obtained in the field with laboratory data on sperm competition, for which a model has already been developed (Parker, 1970a)."

3. "Why do peacocks sport outrageously resplendent plumage compared with their more conservative mates? Why do majestic red deer stags engage in ferocious combat with each other for possession of harems, risking severe injury from their spear-point antlers?"

Organization

1. Experiment/control comparisons: "Plants without egg mimics seemed to be more satisfactory for oviposition than plants with egg mimics."

1. Narrative of the butterfly attacking the vine: "first phase," "second phase," "third phase."

2. Since/then arguments: "Since the female attractiveness pheromone is present in the liver, but not in the fat bodies, and since estrogen treatment can induce the pheromone in the liver and serums of males, we suggest that the pheromone is either the lipoprotein vitellogenin or a lipid-rich part of that large molecule."

2. Narrative of the reproductive cycle of the snake: female attractiveness pheromone, male unattractiveness pheromone, hormonal relations after mating.

3. Predicted/observed comparisons: "For equilibrium between grass and dung surface gain rates, the following algorithm can be formulated from the previous sections:

$$\frac{g_i}{\left\{\frac{m_p}{f_i(1-P_g)}\right\}+46.5}+\frac{g_o}{\left\{\frac{57.2m_p}{f_o(.07m_p+.1)}\right\}+42.25}$$

3. Narrative of the mating process: arrival of males, guarding of the females, capture of the females, strategies of searching.

$$+\frac{g_c}{\left\{\frac{154m_p}{f_c(1-P_g)(1-P_e)(.07m_p+.1)}\right\}+53.5}$$

$$=\frac{g_i}{\left\{\frac{m_g}{f_iP_g}\right\}+46.5} \qquad (1)$$

where the only variables at a given age of dropping are m_p and m_g. For any total number of searching males (m_t) around a dropping, $m_t = m_p + m_g$. Thus at any value of m_t, the model predicts m_p and m_g. This model is reasonably accurate where search time is long relative to gain extraction time, as with the present data."

Examples of the Editing of Gilbert's Scientific American *Manuscript*

1. Gilbert's manuscript
2. Editor's version
3. Gilbert's revision of editor's version

Addition of Narrative Markers

1. To answer this question involves understanding how *Heliconius* find their host plants, how they decide whether or not to leave an egg, and precisely what factors influence the survival of *Heliconius* larvae once they are on the plant.
2. To answer this question one must understand three aspects of interaction between the butterfly and the vine. The *first* is how the female butterfly finds the host plant. The *second* is how the butterfly makes a choice between depositing its eggs or not depositing them. The *third* consists of the factors that affect the survival [of] the eggs and the caterpillars after they are in place on the vine. Natural selection . . . would favor the mutant vine that was harder for the butterfly to *find,* that was less likely to be selected for egg-laying *once it was found,* and

that was inhospitable to the butterfly's offspring *once they were hatched.* [emphasis added]

Introductory Questions

1. 2 questions
2. 10 questions

Single Sentences Rewritten as Several Sentences

1. Because species placing eggs singly are cannibalistic as larvae, females adding eggs to both occupied and unoccupied shoots at random will leave less progeny than females possessing egg avoiding behaviors.
2. To consider predation, the emerging caterpillars of most *Heliconius* species that deposit single eggs are cannibalistic. One may suppose, then, that a major criterion affecting the decision of a female of these species to deposit eggs or not to deposit eggs would be the presence of another female's eggs at the selected site. A mechanism favoring the avoidance of such sites could easily evolve because mutant butterflies with such a mechanism will have more numerous progeny than butterflies the deposit eggs at occupied and unoccupied sites randomly.

Passive Constructions Rewritten as Active

1. When branches of the host plant having similar oviposition sites were placed in the area, no investigations were made by the *H. hewitsoni* females.
2. I collected lengths of *P. pittieri* vines with newly developed shoots and placed them in the patch of vines that was being regularly visited. The females did not, however, investigate the potential egg-laying sites I had supplied.

1. The observation that inexperienced females are strongly attracted to wire models of tendrils . . . suggests . . .
2. For example [WHAT INVESTIGATOR OF WHAT INSTITUTION?], working with *Heliconius* females in the laboratory, showed that they were strongly attracted to wire models of passion vine tendrils. This behavior suggests that . . .
3. Studies of young, inexperienced *Heliconius* females carried out by Peter Abrams in my laboratory, showed that . . .

Terms (emphasis added)

1. *oviposition*
2. *egg-laying*

1. *Germination,* and therefore small plants, occur[s] in forest gaps where disturbances such as treefalls and landslips have exposed the soil to sunlight.
2. A passion vine seed can *germinate* only on open ground where the soil is exposed to sunlight.

1. . . . *divergence* in the visual appearance of *sympatric* vine species . . .
2. Where different passion vine *species coexist* they *differ* from one another in leaf shape.

Added transitions

2. This suggests, of course, that the pressure of *Heliconius* parasitism has favored the evolution of passion vine leaves to deceive the female butterfly.
3. This suggests that the pressure . . .

2. This being self-evident . . .

3. This being the case . . .
   [Marginal note: "It sure isn't self-evident until you make the observations . . ."]