of food intake, is difficult to interpret. In the light of the frequently repeated implication of the clinical literature[9] that many obese patients respond to stressing situations by becoming voracious feeders, the hypothesis that perhaps sexual isolation constitutes a stress which might exert inhibitory effects on the 'satiety' center is one worthy of further testing.

Evidence for some kind of relationship between these factors comes from observations reported by LIEBELT, DEAR and GUILLEMIN[10] who showed that ATG induced hypothalamic lesions in mice are accompanied by an increase in ACTH secretion as measured by presence of circulating corticosteroid levels in treated animals[11].

Resumen. Se investigaron los efectos del 'stress' y la obesidad en diversos mecanismos fisiológicos hipotalámicos. La obesidad fué evidente inyectando aurothioglucose. Estadisticamente se registraron mayores aumentos en ratones aislados que en aquellos mantenidos familiarmente.

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November 24, 1965.

[9] M. BEAUDOIN and J. MAYER, J. Am. diet. Ass. *29*, 29 (1953).
[10] R. A. LIEBELT, W. DEAR, and R. GUILLEMIN, Proc. Soc. exp. Biol. Med. *108*, 377 (1961).
[11] Acknowledgments: We wish to thank Dr. P. L. PEARLMAN of Schering Corporation for providing the aurothioglucose used for this study.

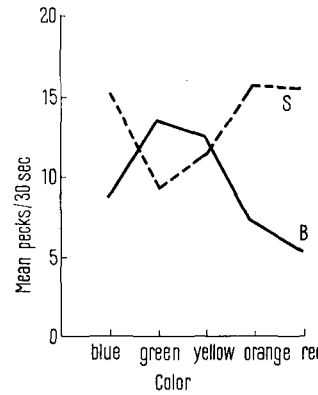
Mirror-Image Color-Preferences for Background and Stimulus-Object in the Gull Chick (*Larus atricilla*)

The newly-hatched chick of the Laughing Gull (*Larus atricilla*) and other species pecks at its parent's reddish beak, thereby eliciting regurgitation of semi-digested food upon which the chick feeds. Tests with models[1] indicate that the optimal stimulus for eliciting the response is an elongate, vertically-oriented shape of about the dimensions of the parent's bill. The stimulus shape is optimal if colored red or blue, and minimal if green, when the background is achromatic. This study reports the effect of the color of the background field when the stimulus-shape is achromatic.

Chicks hatched and reared in dark incubators were tested individually at between 24 and 36 h after hatching. Experimental birds (Group B, of 10 individuals) were tested with colored background panels in a randomized sequence, while control birds (Group S, of 15 individuals) were tested with randomly ordered colored dowel rods, in a repeat of previous experiments[1]. One half of the Group B chicks were first given a white rod with all the background colors in succession, and then a black rod with all the backgrounds; the other half of the group received the black rod first and then the white one. An analogous procedure in which differently colored rods were presented against black backgrounds and white backgrounds was used with Group S. Rods were $^5/_{16}$ in. diameter wooden doweling painted flat black except for the final $4^1/_8$ in. that were painted gloss color, white or black. The rods, pivoted at a point $10^3/_4$ in. above the glossy tip, were moved in time to a metronome set at 80 beats/min, known to be the optimal speed to elicit pecking[1]. Background panels were made of painted masonite rectangles $8^1/_4$ in. by $6^3/_4$ in., placed about $^1/_2$ in. behind the rod. Colors used were spray enamel of high gloss (Testors 'Pla': blue 11, green 24, yellow 14, orange 27, and red 3); spectral reflectance curves for these paints are given in [1].

Each chick was tested individually for a 30 sec trial on each stimulus situation, the trial commencing with the first peck given to the rod. Between trials, a translucent box was lowered over the chick for about 5–10 sec while the stimulus or background was changed. Trials were performed in direct sunlight or in intense indirect sunlight in the field laboratory of the Institute of Animal Behavior at Brigantine National Wildlife Refuge, New Jersey. The number of pecks given during a trial was recorded on a mechanical hand-tally counter; two observers ran the trials and their results agree.

The color preference for the rod shown by Group S (Figure, broken curve) agrees closely with that of a previous experiment utilizing scale models of the parental head with only beak color altered[1]. The color-preference



Mean pecking rates of dark-reared Laughing Gull chicks to chromatic stimuli having achromatic backgrounds (Group S broken curve) and achromatic stimuli having chromatic backgrounds (Group B solid curve) as a function of the color of the chromatic component. Combined means for the achromatic components are shown, although there are slight differences between black and white when the chromatic component is yellow or orange (see text).

[1] J. P. HAILMAN, *The Ontogeny of an Instinct*, unpublished thesis, Duke University (1964); and in preparation.

for background of Group B (Figure, solid curve) is quite different, being nearly the mirror-image of the other curve. Long-wavelength rods and backgrounds (particularly yellow and orange) elicit slightly higher peck rates when contrasting with white than with black; this result is consistent with previous findings[1] and is still being studied.

The results of this experiment and previous ones suggest the following sensory coding mechanism for the gull chick's recognition of the parent's beak: an elongate, vertically-oriented receptive field with a central portion optimally responsive to red and blue wavelengths, and the periphery optimally responsive to green and yellow wavelengths. An hypothesis has been advanced[2] to account for the interaction of receptors in producing the chromatic preference for the stimulus-object; a similar mechanism, having reversed excitatory/inhibitory relations, would code a mirror-image color preference, such as that for the background color.

The studies of HUBEL and WIESEL[3] on cats reveal cortical visual units having elongate receptive fields with centers responding to the onset of a white light and peripheries responding to the cessation. Some of these receptive fields are aligned with their long axes vertical. WOLBARSHT, WAGNER, and MACNICHOL[4] report goldfish retinal units having receptive fields in which the center gives an 'on' response to some wavelengths and an 'off' response to others. Characteristics of the cat units suggest that the goldfish-periphery might give 'on' response to those wavelengths for which the center gives 'off' responses, and vice versa.

The comparison of the gull chick's behavior with the visual units from other vertebrates thus suggests (a) that the chick's perception of the parent may be simple enough to be analyzed physiologically, and (b) that the visual units of the other vertebrates might be used by them in perceptual choices analogous to that of the gull chick.

The near mirror-image color preference is of obvious advantage to the Laughing Gull chick, which views the red parental bill against a background of brownish-yellow nest material and green vegetation. It is also of interest that the adult of the related Herring Gull (*L. argentatus*) possesses a wider beak, only a portion of which is an elongate red spot set on a general bill color of yellow.

Zusammenfassung. Küken der amerikanischen Lachmöwe (Aztekenmöve, *Larus atricilla*), die in dunklen Brutkasten schlüpfen, picken bei farblosem Hintergrund mehr nach roten oder blauen als nach grünen oder gelben Attrappen. Farblose (schwarzweisse) Attrappen lösten dagegen vermehrtes Picken gegen grünen oder gelben Hintergrund aus als gegen einen roten oder blauen. Die Farbbevorzugung ist also spiegelbildlich. Mögliche Deutungen des Wahrnehme-Mechanismus werden diskutiert.

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[2] J. P. HAILMAN, Nature *204*, 710 (1964). Recent (unpublished) evidence implicates the cones bearing light greenish oil droplets as also contributing to the coding, perhaps acting synergistically with the 'yellow' cones to provide the inhibitory input that is combined with the excitatory input from 'red' cones.

[3] D. H. HUBEL and T. N. WIESEL, J. Physiol. *160*, 106 (1962).

[4] M. L. WOLBARSHT and H. G. WAGNER, cited by E. F. MACNICHOL JR., Scient. Am. *211*, 48 (1964); see also the report of similar units in the monkey: D. H. HUBEL and T. N. WIESEL, J. Physiol. *154*, 572 (1960).

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Zur Umwandlung von β-Pyridylcarbinol in Nicotinsäure im tierischen Organismus

β-Pyridylcarbinol* wird seit bald zwanzig Jahren in der Humanmedizin als gefässerweiterndes Mittel angewendet. Hinsichtlich des Metabolismus weiss man, dass Pyridylcarbinol im tierischen Organismus in Nicotinsäure umgewandelt wird. So hat DE RITTER[1] nachgewiesen, dass nach Gaben von Pyridylcarbinol im Harn ein markanter Anstieg der Metabolite des Nicotinsäurestoffwechsels (Nicotinsäureamid, N-Methylnicotinsäureamid und N-Methyl-2-Pyridon-5-Carboxamid) auftritt. Man darf demnach annehmen, dass ein wesentlicher Teil des pharmakodynamischen Effektes von Pyridylcarbinol auf dessen Oxydationsprodukt, die Nicotinsäure, zurückzuführen ist. Über den Ort und die Geschwindigkeit der Oxydation von Pyridylcarbinol in vivo ist bisher nichts bekannt. Wir berichten daher im folgenden über Untersuchungen an der perfundierten Rattenleber.

Methodik. Leberperfusion: Verwendet werden weibliche, 200–220 g schwere Füllinsdorfer Albinoratten. Die Leber des narkotisierten und heparinisierten Tieres wird in üblicher Weise frei präpariert und in situ via V. portae (Einstrom) und V. cava thoracia (Ausstrom) perfundiert. Der Druck wird konstant gehalten auf 18–20 cm Wassersäule. Als Perfusionsmilieu verwenden wir das von H. SCHIMASSEK[2] angegebene Gemisch von gewaschenen Rindererythrozyten und künstlichem Plasma, dem ein Zusatz von 2 mg% bzw. 10 mg% Pyridylcarbinol beigegeben wird. Das gleiche Milieu (150–200 ml) wird dreimal perfundiert, wobei das Hämoglobin nach jedem Durchlauf frisch oxygeniert wird. Aliquote Proben des Milieus werden nach jeder Leberpassage für die chemische Analyse aufgehoben.

Bestimmung von Pyridylcarbinol und Nicotinsäure im Perfusionsplasma: Nach Abzentrifugierung der Erythrozyten wird das Plasma nach AWAPARA[3] enteiweisst. Die

* Wirkstoff von Ronicol (Roche®).

[1] E. DE RITTER, Drug Stand. *28*, 33 (1960).

[2] H. SCHIMASSEK, Biochem. Z. *336*, 460 (1963).

[3] Y. AWAPARA, Arch. Biochem. *19*, 172 (1948).