

Lab: Peppered Moth Simulation

BIOLOGY: CHAPTER 10-PRINCIPLES OF EVOLUTION

Objectives:

- Describe the importance of coloration in avoiding predation
- Relate environmental change to changes in organisms
- Explain how natural selection causes populations to change

Materials

- 8½" x 11" sheet dark background
- 8½" x 11" sheet light background
- Forceps
- Clock with second hand
- 30 light circles (made with hole punch)
- 30 dark circles (made with hole punch)



Purpose: In this lab, you will simulate how predators locate prey in different environments. You will analyze how color affects and organism's ability to survive in certain environments.

Background: The usual form of the peppered moth *Biston betularia* in northern Europe has a light "peppered" pattern of coloration. The moth rests on tree branches and its color pattern **camouflages** it against predatory attack. The camouflage only works against the right background: birds are more likely to eat poorly camouflaged moths, which therefore have a lower **fitness**.

The light coloration of tree branches is mainly caused by lichens that grow there. Smoke pollution in the industrial revolution in the UK killed these lichens near to industrial areas, leaving tree branches black. At about this time, around 1830, a '**melanic**' form of the peppered moth becomes increasingly common in contemporary moth collections. The melanic form is camouflaged on dark tree branches. Through the 19th century, the melanic form increased in frequency until, near industrial regions, it was the normal type of the moth. The increase was almost certainly driven by natural selection.

The moths satisfy all four conditions for natural selection:

- they reproduce;
- their color pattern is inherited;
- there is variation in their color patterns;
- the different forms have different fitnesses.

Before you begin the lab, complete the hypothesis below:

Hypothesis: If the color of the prey matches the background color then

Peppered Moth Lab Answer Key

Michal Rosen-Zvi

A red circular graphic with a gradient, appearing as a semi-circle or a partial circle, located to the right of the author's name.

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web dec 9 2017 contd design moments in braced columns maximum design column moment greatest of a m_2 b m_1 c m_1 d m_2 e m_1 f m_2 g m_1 h m_2 i m_1 j m_2 k m_1 l m_2 m m_1 n m_2 o m_1 p m_2 q m_1 r m_2 s m_1 t m_2 u m_1 v m_2 w m_1 x m_2 y m_1 z m_2 aa m_1 ab m_2 ac m_1 ad m_2 ae m_1 af m_2 ag m_1 ah m_2 ai m_1 aj m_2 ak m_1 al m_2 am m_1 an m_2 ao m_1 ap m_2 aq m_1 ar m_2 as m_1 at m_2 au m_1 av m_2 aw m_1 ax m_2 ay m_1 az m_2 ba m_1 bb m_2 bc m_1 bd m_2 be m_1 bf m_2 bg m_1 bh m_2 bi m_1 bj m_2 bk m_1 bl m_2 bm m_1 bn m_2 bo m_1 bp m_2 bq m_1 br m_2 bs m_1 bt m_2 bu m_1 bv m_2 bw m_1 bx m_2 by m_1 bz m_2 ca m_1 cb m_2 cc m_1 cd m_2 ce m_1 cf m_2 cg m_1 ch m_2 ci m_1 cj m_2 ck m_1 cl m_2 cm m_1 cn m_2 co m_1 cp m_2 cq m_1 cr m_2 cs m_1 ct m_2 cu m_1 cv m_2 cw m_1 cx m_2 cy m_1 cz m_2 da m_1 db m_2 dc m_1 dd m_2 de m_1 df m_2 dg m_1 dh m_2 di m_1 dj m_2 dk m_1 dl m_2 dm m_1 dn m_2 do m_1 dp m_2 dq m_1 dr m_2 ds m_1 dt m_2 du m_1 dv m_2 dw m_1 dx m_2 dy m_1 dz m_2 ea m_1 eb m_2 ec m_1 ed m_2 ee m_1 ef m_2 eg m_1 eh m_2 ei m_1 ej m_2 ek m_1 el m_2 em m_1 en m_2 eo m_1 ep m_2 eq m_1 er m_2 es m_1 et m_2 eu m_1 ev m_2 ew m_1 ex m_2 ey m_1 ez m_2 fa m_1 fb m_2 fc m_1 fd m_2 fe m_1 ff m_2 fg m_1 fh m_2 fi m_1 fj m_2 fk m_1 fl m_2 fm m_1 fn m_2 fo m_1 fp m_2 fq m_1 fr m_2 fs m_1 ft m_2 fu m_1 fv m_2 fw m_1 fx m_2 fy m_1 fz m_2 ga m_1 gb m_2 gc m_1 gd m_2 ge m_1 gf m_2 gg m_1 gh m_2 gi m_1 gj m_2 gk m_1 gl m_2 gm m_1 gn m_2 go m_1 gp m_2 gq m_1 gr m_2 gs m_1 gt m_2 gu m_1 gv m_2 gw m_1 gx m_2 gy m_1 gz m_2 ha m_1 hb m_2 hc m_1 hd m_2 he m_1 hf m_2 hg m_1 hh m_2 hi m_1 hj m_2 hk m_1 hl m_2 hm m_1 hn m_2 ho m_1 hp m_2 hq m_1 hr m_2 hs m_1 ht m_2 hu m_1 hv m_2 hw m_1 hx m_2 hy m_1 hz m_2 ia m_1 ib m_2 ic m_1 id m_2 ie m_1 if m_2 ig m_1 ih m_2 ii m_1 ij m_2 ik m_1 il m_2 im m_1 in m_2 io m_1 ip m_2 iq m_1 ir m_2 is m_1 it m_2 iu m_1 iv m_2 iw m_1 ix m_2 iy m_1 iz m_2 ja m_1 jb m_2 jc m_1 jd m_2 je m_1 jf m_2 jg m_1 jh m_2 ji m_1 jj m_2 jk m_1 jl m_2 jm m_1 jn m_2 jo m_1 jp m_2 jq m_1 jr m_2 js m_1 jt m_2 ju m_1 jv m_2 jw m_1 jx m_2 jy m_1 jz m_2 ka m_1 kb m_2 kc m_1 kd m_2 ke m_1 kf m_2 kg m_1 kh m_2 ki m_1 kj m_2 kk m_1 kl m_2 km m_1 kn m_2 ko m_1 kp m_2 kq m_1 kr m_2 ks m_1 kt m_2 ku m_1 kv m_2 kw m_1 kx m_2 ky m_1 kz m_2 la m_1 lb m_2 lc m_1 ld m_2 le m_1 lf m_2 lg m_1 lh m_2 li m_1 lj m_2 lk m_1 ll m_2 lm m_1 ln m_2 lo m_1 lp m_2 lq m_1 lr m_2 ls m_1 lt m_2 lu m_1 lv m_2 lw m_1 lx m_2 ly m_1 lz m_2 ma m_1 mb m_2 mc m_1 md m_2 me m_1 mf m_2 mg m_1 mh m_2 mi m_1 mj m_2 mk m_1 ml m_2 mn m_1 mo m_2 mp m_1 mq m_2 mr m_1 ms m_2 mt m_1 mu m_2 mv m_1 mw m_2 mx m_1 my m_2 mz m_2 na m_1 nb m_2 nc m_1 nd m_2 ne m_1 nf m_2 ng m_1 nh m_2 ni m_1 nj m_2 nk m_1 nl m_2 nm m_1 no m_2 np m_1 np m_2 oq m_1 or m_2 os m_1 ot m_2 ou m_1 ov m_2 ow m_1 ox m_2 oy m_1 oz m_2 pa m_1 pb m_2 pc m_1 pd m_2 pe m_1 pf m_2 pg m_1 ph m_2 pi m_1 pj m_2 pk m_1 pl m_2 pm m_1 pn m_2 po m_1 pp m_2 pq m_1 pr m_2 ps m_1 pt m_2 pu m_1 pv m_2 pw m_1 px m_2 py m_1 pz m_2 qa m_1 qb m_2 qc m_1 qd m_2 qe m_1 qf m_2 qg m_1 qh m_2 qi m_1 qj m_2 qk m_1 ql m_2 qm m_1 qn m_2 qo m_1 qp m_2 qq m_1 qr m_2 qs m_1 qt m_2 qu m_1 qv m_2 qw m_1 qx m_2 qy m_1 qz m_2 ra m_1 rb m_2 rc m_1 rd m_2 re m_1 rf m_2 rg m_1 rh m_2 ri m_1 rj m_2 rk m_1 rl m_2 rm m_1 rn m_2 ro m_1 rp m_2 rq m_1 rr m_2 rs m_1 rt m_2 ru m_1 rv m_2 rw m_1 rx m_2 ry m_1 rz m_2 sa m_1 sb m_2 sc m_1 sd m_2 se m_1 sf m_2 sg m_1 sh m_2 si m_1 sj m_2 sk m_1 sl m_2 sm m_1 sn m_2 so m_1 sp m_2 sq m_1 sr m_2 ss m_1 st m_2 su m_1 sv m_2 sw m_1 sx m_2 sy m_1 sz m_2 ta m_1 tb m_2 tc m_1 td m_2 te m_1 tf m_2 tg m_1 th m_2 ti m_1 tj m_2 tk m_1 tl m_2 tm m_1 tn m_2 to m_1 tp m_2 tq m_1 tr m_2 ts m_1 tt m_2 tu m_1 tv m_2 tw m_1 tx m_2 ty m_1 tz m_2 ua m_1 ub m_2 uc m_1 ud m_2 ue m_1 uf m_2 ug m_1 uh m_2 ui m_1 uj m_2 uk m_1 ul m_2 um m_1 un m_2 uo m_1 up m_2 uq m_1 ur m_2 us m_1 ut m_2 uu m_1 uv m_2 uw m_1 ux m_2 uy m_1 uz m_2 va m_1 vb m_2 vc m_1 vd m_2 ve m_1 vf m_2 vg m_1 vh m_2 vi m_1 vj m_2 vk m_1 vl m_2 vm m_1 vn m_2 vo m_1 vp m_2 vq m_1 vr m_2 vs m_1 vt m_2 vu m_1 vv m_2 vw m_1 vx m_2 vy m_1 vz m_2 wa m_1 wb m_2 wc m_1 wd m_2 we m_1 wf m_2 wg m_1 wh m_2 wi m_1 wj m_2 wk m_1 wl m_2 wm m_1 wn m_2 wo m_1 wp m_2 wq m_1 wr m_2 ws m_1 wt m_2 wu m_1 wv m_2 ww m_1 wx m_2 wy m_1 wz m_2 xa m_1 xb m_2 xc m_1 xd m_2 xe m_1 xf m_2 xg m_1 xh m_2 xi m_1 xj m_2 xk m_1 xl m_2 xm m_1 xn m_2 xo m_1 xp m_2 xq m_1 xr m_2 xs m_1 xt m_2 xu m_1 xv m_2 xw m_1 xx m_2 xy m_1 xz m_2 ya m_1 yb m_2 yc m_1 yd m_2 ye m_1 yf m_2 yg m_1 yh m_2 yi m_1 yj m_2 yk m_1 yl m_2 ym m_1 yn m_2 yo m_1 yp m_2 yq m_1 yr m_2 ys m_1 yt m_2 yu m_1 yv m_2 yw m_1 yx m_2 yy m_1 yz m_2 za m_1 zb m_2 zc m_1 zd m_2 ze m_1 zf m_2 zg m_1 zh m_2 zi m_1 zj m_2 zk m_1 zl m_2 zm m_1 zn m_2 zo m_1 zp m_2 zq m_1 zr m_2 zs m_1 zt m_2 zu m_1 zv m_2 zw m_1 zx m_2 zy m_1 zz m_2